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DUBLIN
EXAMINATION PAPERS:

BEING

A Supplement

TO THE

UNIVERSITY CALENDAR

FOR THE YEAR

1875.



DUBLIN:

Printed at the University Press.

HODGES, FOSTER, AND CO., 101, GRAFTON STREET,

PUBLISHERS TO THE UNIVERSITY.

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P. 2525

DUBLIN :
PRINTED AT THE UNIVERSITY PRESS,
BY M. H. GILL.

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DUBLIN EXAMINATION PAPERS,

1874.

UNDERGRADUATE HONOR EXAMINATION PAPERS.

Winter Term.

SENIOR SOPHISTERS.

Ethics.

BUTLER AND STEWART.

DR. STUBBS.

1. In what cases, according to Butler, does Shaftesbury's system fail? Show that it does fail, and that Butler's system supplies the remedy.
2. What are the chief or superior principles in the nature of man; and why are they so?
3. What cautions must be used in making the inward frame of man a guide in morals?
4. Stewart says that "the notions of reward and punishment presuppose the notions of right and wrong. They are sanctions of virtue; but they suppose the existence of some previous obligation." Write a note explaining these words.
5. By what analogy does Stewart show that it is *a priori* likely that there should be implanted in the human mind a peculiar class of active principles whose object should be the good of others.
6. Stewart cites an instance in which the study of final causes promoted physical knowledge.
7. Give a short summary of Butler's argument in his first three sermons.

DR. TABLETON.

1. Show that Butler fully admits that the chief aim of man is twofold.

What results in reference to man's practical belief follow from this duplicity?

2. As regards the coincidence of virtue with benevolence, Butler seems to concede more in the sermons than in the dissertation; how may the apparent discrepancy be explained?

3. Show that Butler's first argument to show the unlawfulness of revenge appears to involve a *petitio principii*, but that in reference to human beings it is practically valid.

4. How does Butler consider the different senses in which the precept to love our neighbour as ourselves may be understood, and how does he show that in no case does it involve absurd consequences.

5. How does Butler show that when there is a competition between the indulgence of liberality and compassion the latter is to have the preference.

State in general terms the principles of which he makes use in order to determine the question.

6. What reflections does Butler mention as having a tendency to lead us to a right behaviour towards those who have offended us?

7. How does Butler show that from self-love we should endeavour to get over all inordinate regard to ourselves, and how does he generalise this conclusion?

8. By means of what considerations does Butler determine the mode in which the highest happiness of man in a future state will probably be constituted?

ARISTOTLE.—ADAM SMITH,

DR. SHAW.

1. The viciousness of the world does not hinder it, says Butler, from being a school of virtue. From what principle laid down by Aristotle may the same conclusion be drawn?

2. How does Aristotle meet the objection that his theory of the mode in which virtues are acquired involves the paralogism of supposing them already acquired.

3. Give Aristotle's proofs that the virtues are neither *πάνη* nor *δυνάμεις*.

4. Give Aristotle's explanation of the fact that in some cases the excess, in others the defect is nearer to the virtuous mean; and supplement his explanation if it appears to you to be insufficient.

5. A principle similar to Butler's supremacy of conscience appears in Aristotle's account of *προαίρεσις*? Show that his *ηγούμενον* means something quite different from "the ruling passion."

6. Sketch the principal features of *δὲ σῶφρων*, as described by Aristotle.

7. Compare and criticise the accounts given by Smith of the Platonic virtues of Temperance and Justice, respectively.

8. From what principles, according to Smith, were the paradoxes of the Stoics evolved?

9. Cite the principal points of the reply to the Licentious system of Dr. Mandeville.

10. What were the strong and what the weak points of the system which was the reaction against the ethical system of Hobbes?

Natural Science.

GEOLOGY.

DR. HAUGHTON.

1. State the minerals composing the following Rocks:—

- (a). Granite.
- (b). Diorite.
- (c). Dolerite.

2. Give a general classification of Stratified Rocks, and the conditions under which they were formed.

3. Describe the chief minerals contained in the Feldspar Family.

4. Name the most important of the ores of Copper.

5. What are the differences, as to precipitation of moisture, between the Eastern and Western sides of intertropical and extratropical continents?

6. What is the cause of cleavage in rock masses; and what are the effects produced by it upon the embedded fossils?

7. Describe the arguments drawn from the phenomena of Coral reefs, by which Mr. Darwin shows that a large area of the Pacific has been undergoing subsidence.

8. State in general the laws of movement of glaciers, and the geological effects they are capable of producing.

9. Describe generally the geographical distribution of Volcanoes.

10. Explain the origin of Artesian wells, and the cause of intermittent springs.

ZOOLOGY.

DR. MACALISTER.

1. Describe the organization of *Myxobrachia pluteus*, and refer it to its proper place in the system of Nature.

2. Give a full diagnosis of any two of the following genera:—*Encyrtidium*, *Acanthometra*, *Stylorhynchus*, *Raphidiophrys*, *Corycia*, *Actinosphaerium*, *Actinophrys*.
3. What are the characteristics of the corticate sponges?
4. Describe the peculiarities in the organization of *Guancha blanca*, and *Leucosolenia*.
5. Distinguish the groups of calcareous sponges, *Ascones*, *Leucones*, and *Sycones* from each other.
6. Describe the organization of a Gephyrean worm.
7. What are the structural peculiarities of *Uraster rubens*.
8. Describe the development of a Sertularian Hydroid.
9. What are the three important points in the structure of *Hydra* which have been ascertained by the researches of Kleinenberg.
10. Give an outline of the classification of Octactinæ (Alcyonaria).

BOTANY.

DR. E. PERCEVAL WRIGHT.

1. What is remarkable about the internal structure of the Ovules of the Coniferæ?
2. Describe the nucleus in *Taxus*.
3. What are Hofmeister's conclusions as to the development of the embryo in Abietinæ.
4. Who discovered the poly-embryony of the Coniferæ?
5. In what light does Hofmeister regard the embryo-sac of the Coniferæ?
6. Describe the form of conjugation met with in *Spirogyra*.
7. Describe the fructification in Mosses.
8. Give a sketch of any unimpregnated Phanerogamous Ovule.
9. Give an example of protandry in a native plant.
10. Give some examples of irritable stamens.

History and Political Science.

MODERN HISTORY.

PROFESSOR DOWDEN.

1. "Four times . . . within the period of authentic history the Scythian tribes have . . . poured themselves into Europe."

2. Mr. Hallam enumerates several circumstances which tended to the preservation of the Greek Empire. What was the partition of the Empire made after the capture of Constantinople by the Latins?

3. What are the judgments passed by Burnet upon the characters of (a) Marquis of Halifax, (b) Tillotson, (c) Mackay, (d) Atterbury?

4. Give an account of the attack made in the House of Lords upon the Partition Treaty, and of the impeachment of the former ministers—1701.

5. Relate the most important particulars of the dispute which arose about some electors of Aylesbury, 1704-5.

6. What measures were proposed, and what measures were actually taken, in the reign of William III. to rectify the coin?

7. What account had Burnet from Monsieur Herval of the Duke of Savoy's departure from the Alliance in 1696? How did the French discover his return to the Alliance in 1703?

8. What was the method of proceeding in trials of Treason in Scotland previous to the Act of 1709? What were the three heads of this Act? What were the amendments carried in the House of Commons?

9. What was the design for assassinating the King and invading England in 1696? "The way that Charnock and King took to vindicate King James did rather fasten the imputation more upon him."

10. Write an estimate of Burnet considered as a historian.

PROFESSOR BARLOW.

1. What account does Gibbon give of the Pontificate and character of Gregory the Great?

2. He asserts that "of the characters conspicuous in history, that of Heraclius is one of the most extraordinary and inconsistent." Explain this.

3. Give an account of the wars of Mahomet against the Koreish.

4. Who are the twelve Imans of the Persian creed? Relate the history of the death of Hosein, son of Ali.

5. Give some account of the conquest of Spain by the Arabs.

6. Origin of Leopolis, and the Leonine city?

7. In what year does Hallam place the very *nadir* of English prosperity, and on what grounds?

8. Discuss the policy of the Septennial Bill.

9. According to Hallam, the power of Government—thereby meaning not the personal authority of the sovereign, but that of his ministers—has been, in several respects, much enhanced since the beginning of the eighteenth century?

10. Write a note on the History of the Geraldines in the reign of Henry VIII.

POLITICAL ECONOMY.

PROFESSOR DONNELL.

1. What phenomena gave plausibility to the Mercantile Theory?
2. Trace the natural progress of society, from the pastoral to the agricultural state.
3. Contrast the economical state of the agricultural communities of ancient Europe with that of the agricultural communities of the Middle Ages.
4. How far has Political Economy to do with physical laws and human laws respectively?
5. Can productive labour be wasted: if so, how?
6. Is the money in the funds part of the wealth of the country? Give the reasons for your answer.
7. "The income tax by taking from the rich what they would have expended on the poor injures the poor as much as if it had been directly levied from them." Is this true?
8. Discuss the comparative merits of large and small farming.
9. How is the principle of co-operation of labour related to the principle of division of labour?
10. Do wages vary with the price of food?

 Modern Literature.

ENGLISH LITERATURE.

MR. PALMER.

1. Write out a description of the plot of *Comus*.
What analogous compositions of other writers may Milton have had before him? *Comus* was a character in a masque of Ben Jonson's?
2. Mr. Craik says that Milton never uses *his* in a neuter sense: discuss the truth of this statement.
3. Arrange Milton's chief poems in chronological order. What was the date and occasion of the poem of *Lycidas*?
4. What is the proper composition of the English Sonnet? Write out any sonnet of Milton which you admire. Explain the sonnet which refers to 'Tetrachordon.'
5. Write an account of the debate in Pandemonium in the second book of *Paradise Lost*.
6. Milton's great linguistic learning is exhibited in the propriety of his epithets and descriptions of persons and places. Illustrate this from *Paradise Lost*.

7. Where do the following lines occur :—Give the context wherever you can.

- (a) That last infirmity of noble mind. A parallel to this line is found in a classical author?
- (b) ——— to be weak is miserable.
- (c) ——— airy tongues that syllable men's names.
- (d) Not to know me argues yourselves unknown.
- (e) All is best, though we oft doubt.
- (f) "There the bright seraphim in burning row,
Their loud uplifted angel trumpets blow."

8. Mention some of the more remarkable Latinisms of the *Paradise Lost*.

PROFESSOR DOWDEN.

1. Who was Samuel Hartlib? Why did Milton address to Hartlib his treatise on Education?

2. Without entering into minute details, state the general principles upon which Milton formed his scheme of education (a) with reference to things to be acquired; (b) the order of their acquisition.

3. What does Milton mean when he says that *poetry* is "more simple, sensuous, and passionate," than logic?

4. With what object does Milton, in *Areopagitica*, refer to (a) Selden, (b) Spenser, (c) Julian the Apostate?

5. How does Milton distinguish between true and false unity in a Church?

6. Characterize the genius of Sir Thomas Browne.

7. Reproduce, in Browne's manner, the passage in which he expresses his love of mysteries and of "impossibilities in religion."

8. Write explanatory notes on the following passages :—

- (a). "We need not look again for *Plato's year*."
- (b). "I teach my haggard . . reason to stoop unto the lure of faith."
- (c). "There is in us not three but a trinity of souls."
- (d). The philosophy of Hermes.
- (e). There is but one first cause, and four second causes, of all things.
- (f). Pieces only fit to be placed in Pantagruel's library.
- (g). "I would not omit a copy of Enoch's pillars."
- (h). "I often pitied the miserable bishop that suffered in the cause of the Antipodes."
- (i). The legerdemain of changelings.
- (j). "As yet I have not seen one revolution of Saturn."

GERMAN.

MR. BARLOW.

1. Translate into English:—

(a). "Ueber den feindlichen Häusern war rabenschwarze Nacht, die Welt sah aus wie eine grosse Kohlengrube, in der die Leuchte erloschen ist. Der Wind fuhr durch die Bäume des Parkes, man hörte ein Rauschen der Blätter, Geknarr der Aeste, ein tiefes, zorniges Brummen in der Luft, aber man sah nichts als einen ungeheuren schwarzen Vorhang, der den Stadtwald verhüllte, und ein schwarzes Zeltdach, das über die Häuser gespannt war. Die Strassen der Stadt waren leer, wer ein freundliches Verhältniss zu seinem Bett hatte, lag längst darin, wer eine Schlafmütze besass, heut zog er sie über die Ohren. Alles Menschliche barg sich in tiefem Schweigen, auch den Stundenschlag der Thurm-glocke zerriss der Sturmwind und führte die einzelnen Töne hierhin und dorthin, so dass Niemand die Schläge der Mitternachtsstunde vollständig zusammenbringen konnte. Nur um das Haus des Herrn Hummel kläffte die wilde Jagd, die Hunde fuhren im Hofe umher, unbeirrt durch Sturm und Finsterniss, und wenn der Wind wie ein Hifthorn zwischen den Häusern blies, bellte die Meute dem Schläfe der Menschen ein greuliches Halali."—FREITAG.

(b). "Der Wagen des Oberamtmanns fuhr vor. Wortreich waren die Abschiedsgrüsse der Frau Oberamtmann; auch der Starrsinn des Gatten war durch die Vorstellungen seiner Frau gemildert, und als er die Mütze in der Hand hielt, bequemte er sich mit erträglichem Anstande zum Biss in den erwähnten sauren Apfel. Er trat auf die Schreiberleute aus der Stadt zu, und ersuchte sie, auch ihm das Vergnügen ihres Besuches zu schenken, und als er die freundlichen Worte sprach, übte die Einladung selbst auf sein ehrliches Gemüth eine weitere besänftigende Wirkung, es streckte auch noch die Hand aus, und als diese ihm kräftig geschüttelt wurde, näherte er sich der Ansicht, das die Fremden im Grunde auch nicht so übel wären. Der Gutsherr begleitete die Gäste zu dem Wagen, Hans reichte die Schachtel hinein, und beide Landwirthe beobachteten unter dem letzten Gutnachruf noch mit Kennerblick, wie die Braunen anzogen."—FREITAG.

(c). "Sie kam gleich wieder herauf; ihr Röckchen umschloss sie fest, ihre Haare waren von den Wellen aufgelös't und hingen schwer über den Hals nieder, mit den Armen ruderte sie emsig und schwamm, ohne einen Laut von sich zu geben, kräftig von der Barke weg nach der Küste zu. Der jähe Schreck schien ihm die Sinne gelähmt zu haben. Er stand im Kahn, vorgebeugt, die Blicke starr nach ihr hingerichtet, als begebe sich ein Wunder vor seinen Augen. Dann Schüttelte er sich, stürzte nach den Rudern, und fuhr ihr mit aller Kraft, die er aufzubieten hatte, nach, während der Boden seines Kahns von dem immer zuströmenden Blute roth wurde.

"Im Nu war er an ihrer Seite, so hastig sie schwamm. 'Bei Maria Santissima!' rief er, 'komm in den Kahn. Ich bin ein Toller gewesen; Gott weiss, was mir die Vernunft benebelte. Wie ein Blitz vom Himmel fuhr mir's ins Hirn, dass ich ganz aufbrannte und wusste nicht was ich that und redete. Du sollst mir nicht vergeben, Laurella, nur dein Leben retten und wieder einsteigen.'"—HEYSE.

2. Translate into German :—

"With his assistance, the list of blood-councillors was quickly completed. No one who was offered the office refused it. Noircarmes and Berlaymont accepted it with very great eagerness. Several presidents and councillors of the different provincial tribunals were appointed, but all the Netherlanders were men of straw. Two Spaniards, Del Rio and Vargas, were the only members who could vote; while their decisions, as already stated, were subject to reversal by Alva. Del Rio was a man without character or talent, a mere tool in the hands of his superiors, but Vargas was a terrible reality."

3. Write explanatory notes on the following passages in "Faust":—

(a). "Mir zeigte sie ihn im Krystall,
Soldatenhaft, mit mehreren Verwegen;
Ich seh' mich um, ich such' ihn überall,
Allein mir will er nicht beegnen."

(b). "Verschwind' in Flammen,
Salamander!
Rauschend fliesse zusammen,
Undene!
Leucht' in Meteoren-Schöne,
Sylphe!
Bring' häusliche Hülfe,
Incubus! Incubus!
Tritt hervor und mache den Schluss."

(c). "Gesteh' ich's nur! Dass ich hinausspaziere
Verbietet mir ein kleines Hinderniss,
Der Drudenfuss auf eurer Schwelle."

(d). "Betrachte sie genau!
Lilith ist das."

(e). "Nehmt mich mit! nehmt mich mit!
Ich steige schon dreihundert Jahr',
Und kann den Gipfel nicht erreichen.
Ich wäre gern bei meines Gleichen."

4. Explain the expressions, "Proktophantasmist," "Walpurgisnacht."

5. Compare the stories of Sigfrid in the "Nibelungenlied," and in the "Hürnin Sigfrid."

6. Give some account of (a) "Pfaffe Amis," (b) "Till Eulenspiegel."

7. Mention some of the works of Andreas Gryphius. Who wrote the lines:

"Wir holen Viole in blumichten Auen, Narzissen entspiessen von
perlenen Thauen,

"Die besten der Westen nun Blumen ausstreuen, die Felder, die
Wälder ihr Laubwerk erneuen."

8. "Mit diesem Tage begann für Ilse eine neue Zeit des Lernens. Bald wurde den Erläuterungen des Gatten eine feste Tagesstunde bestimmt, für Ilse die werthvollste Zeit des Tages."

What was the Professor's system of education?

PROFESSOR SELSS.

1. Translate into German :—

It was about this time that Goethe undertook the care of Peter Im-Baumgarten, a Swiss peasant boy, the protégé of his friend Baron Lindau. The death of the Baron had left Peter once more without protection. Goethe, whose heart was open to all, especially to children, gladly undertook to continue the Baron's care; and as we have seen him sending home an Italian image-boy to his mother at Frankfurt, and Wilhelm Meister undertaking the care of Mignon and Felix, as well as that of the harper, so does this "cold" Goethe now add love to charity and become a father to the fatherless.—LEWIS, LIFE OF GOETHE.

2. Translate into English :—

'Aus so entlegener Zeit werden keine Todten-Scheine verlangt,' versetzte der Geistliche, 'ich kann den hochverehrten Herren deshalb keinerlei Bescheid versprechen. Dennoch, wenn es Ihnen nur darum zu thun ist, und Sie nichts der Kirche Nachtheiliges aus alten Schriften eruiren wollen, bin ich gewillt, denselben das älteste der vorhandenen Bücher zu präsentieren.' Er ging in eine Kammer und brachte ein Buch hervor, dem der Moder des feuchten Raumes die Ränder beschädigt hatte. Auf dem Vorsetzblatt stand ein Verzeichniss geistlicher Würdenträger des Ortes in lateinischer Sprache. Eine der ersten Notizen war: 'Im Jahre des Herrn 1637 im Monat Mai ist der verehrungswürdige Bruder Tobias Bachhuber, der letzte Mönch des hiesigen Klosters, an der Seuche der Pestilenz gestorben. Der Herr sei ihm gnädig.' Der Professor wies dem Freunde schweigend die Stelle. Der Doctor schrieb die lateinischen Worte ab; sie gaben dankend das Buch zurück und empfahlen sich.—G. FREYTAG.

3. Relate the story of 'Die verlorene Handschrift.'

4. Analyse one of Freytag's plays, or his other great novel.

5. Translate the following lines from Faust, and point out the passages from which they are taken :—

(a) Und mich ergreift ein längst entwöhntes Sehnen
Nach jenem stillen ernsten Geisterreich.

(b) Von allen Geistern die verneinen
Ist mir der Schalk am wenigsten zur Last.

(c) Die Geisterwelt ist nicht verschlossen,
Dein Sinn ist zu, dein Herz ist todt.

(d) Du führst die Reihe der Lebendigen
Vor mir vorbei und lehrst mich meine Brüder
Im stillen Busch, in Luft und Wasser kennen.

(e) Heinrich, mir graut's vor dir!

6. Give an account of the poetry of the Meistersänger.

7. What was the probable origin and the date of the epic of the Nibelungen? What dialect and what metre does it employ?

FRENCH.

DR. ATKINSON.

Translate closely and accurately the following passage :—

I.

Dieu mercy et Jaques Thibault,
 Qui tant d'eau froide m'a faict boyre,
 En ung bas lieu, non pas en hault;
 Manger d'angoisse mainte poire;
 Enfermé. . Quand j'en ay memoire,
 Je pry pour luy et *reliqua*,
 Que Dieu luy doint. . et voire, voire,
 Ce que je pense. . *et cetera*.

II.

Toutesfoys, je n'y pense mal,
 Pour luy et pour son lieutenant;
 Aussi pour son official,
 Qui est plaisant et advenant,
 Que faire n'ay du remenant;
 Mais du petit maistre Robert? . .
 Je les ayme, tout d'ung tenant,
 Ainsi que faict Dieu le Lombart.

III.

Si me souvient, à mon advis,
 Que je feis, à mon partement,
 Certains lays, l'an cinquante six,
 Qu'aucuns, sans mon consentement,
 Voulurent nommer *Testament*;
 Leur plaisir fut, et non le mien:
 Mais quoy! on dit communement,
 Qu'un chascun n'est maistre du sien.

IV.

Somme, plus ne diray qu'ung mot,
 Car commencer veuil à tester:
 Devant mon clerc Fremin, qui m'ot
 (S'il ne dort), je vueil protester,
 Que n'entends homme detester,
 En ceste presente ordonnance;
 Et ne la vueil manifester
 Sinon au royaume de France.

V.

Je sens mon cueur qui s'affoiblist,
 Et plus je ne puy papier.

Fremin, siez-toy près de mon liet,
 Que l'on ne me viengne espier!
 Prens tost encre, plume et papier,
 Ce que nomme escryz vistement;
 Puyz fais-le partout copier,
 Et vecy le commencement.

Translate into French :—

There is something, too, in the sternly simple features of the Spanish landscape, that impresses on the soul a feeling of sublimity. The immense plains of the Castiles and of La Mancha, extending as far as the eye can reach, derive an interest from their very nakedness and immensity, and have something of the solemn grandeur of the ocean. In ranging over these boundless wastes, the eye catches sight here and there of a straggling herd of cattle attended by a lonely herdsman, motionless as a statue, with his long slender pike tapering up like a lance into the air; or, beholds a long train of mules slowly moving along the waste like a train of camels in the desert; or, a single herdsman, armed with blunderbuss and stiletto, and prowling over the plain. Thus the country, the habits, the very looks of the people, have something of the Arabian character. The general insecurity of the country is evinced in the universal use of weapons. The herdsman in the field, the shepherd in the plain, has his musket and his knife. The wealthy villager rarely ventures to the market-town without his trabuco, and, perhaps, a servant on foot with a blunderbuss on his shoulder; and the most petty journey is undertaken with the preparation of a warlike enterprise.

Translate into English closely and accurately :—

Ie quitte cette premiere raison, et croy qu'il vault mieux dire que ce mal vienne de leur mauvaise façon de se prendre aux sciences; et qu'à la mode dequoy nous sommes instruits, il n'est pas merveille, si ny les escoliers, ny les maistres, n'en deviennent pas plus habiles, quoy qu'ils s'y facent plus doctes. De vray, le soing et la despense de nos peres ne vise qu'à nous meubler la teste de science: du iugement et de la vertu, peu de nouvelles. Criez d'un passant à nostre peuple: "O le sçavant homme!" et d'un aultre: "O le bon homme!" il ne fauldra pas à des-tourner les yeulx et son respect vers le premier. Il y fauldroit un tiers crieur: "O les lourdes testes!" Nous nous enquerons volontiers: "Sçait il du grec ou du latin? escrit il en vers ou en prose?" mais s'il est devenu meilleur ou plus advisé, c'estoit le principal, et c'est ce qui demeure derriere. Il falloit s'enquerir qui est mieulx sçavant, non qui est plus sçavant.

Nous ne travaillons qu'à remplir la memoire, et laissons l'entendement et la conscience vuides. Tout ainsi que les oyseaux vont quelquesfois à la queste du grain, et le portent au bec sans le taster pour en faire bechee à leurs petits: ainsi nos pedantes vont pillotants la science dans les livres, et ne la logent qu'au bout de leurs levres, pour la degorger seulement et mettre au vent. C'est merveille combien proprement la sottise se loge sur mon exemple: est ce pas faire de mesme ce que ie fais en la plus part de cette composition? ie m'en vois escorniffant, par cy par là, des livres,

les sentences qui me plaisent, non pour les garder (car ie n'ay point de gardoire), mais pour les transporter en cettuy cy : où, à vray dire, elles ne sont non plus miennes qu'en leur premiere place ; nous ne sommes, ce crois ie, sçavants que de la science presente : non de la passee, aussi peu que de la future. Mais, qui pis est, leurs escholiers et leurs petits ne s'en nourrissent et alimentent non plus : ains elle passe de main en main, pour cette seule fin d'en faire parade, d'en entretenir aultruy, et d'en faire des contes, comme une vaine monnoye inutile à tout aultre usage et emploite qu'à compter et iecter. Nous sçavons dire : "Cicero dict ainsi ; Voylà les mœurs de Platon ; Ce sont les mots mesmes d'Aristote !" mais nous, que disons nous nous mesmes ? que iugeons nous ? que faisons nous ? Autant en droit bien un perroquet.

[All answers to be written in French].

1. Write a notice on each of the following poets : A. Chartier, C. d'Orléans, F. Villon ; showing the peculiar nature of their genius, and comparing their influence on French poetry. (Quote as much as you can of the works of the above poets in illustration).

2. Le côté le plus faible de son œuvre [Chas. d'Orléans] ?

3. " Dans la première littérature (française) les classes élevées ont fourni un plus grand nombre de noms que depuis."

How do you account for this ?

4. Write an article on French poetry of the 15th century, so far as it did not include the three names above mentioned.

5. Trace as far as you can the influence of the language of Montaigne on the modern prose literature of France.

6. Subject for essay : Faut-il toujours sacrifier un talent à l'autre ?

MR. PALMER.

Subjects for Composition.

1. Rhyme.

2. The influence of Milton on the progress of Modern Thought.

3. The Sublime in Poetry.

[Choose one subject.]

JUNIOR SOPHISTERS.

Mathematical Physics.

MECHANICS.

A.

MR. WILLIAMSON.

1. If PT , $P'T$ be the tangents at two points P , P' , on a parabolic trajectory, and v , v' the velocities at those points, prove that

$$v : v' = PT : P'T.$$

2. A weight, hanging vertically, draws an equal weight along a rough horizontal plane. If at the end of a second from the commencement of motion the string be cut, find how far the weight would move along the plane before being brought to rest by friction.

3. In different circular orbits described around the same centre of force, prove that the squares of the times of revolution vary as the cubes of the distances from the centre of force; the force varying as the inverse square of the distance.

4. Find the whole area of the loop of the curve

$$a^3 y^2 = x^4 (b + x).$$

5. In the curve represented by the polar equation

$$r^n = a^n \cos n\theta,$$

prove that the angle between the radius vector to any point, and the perpendicular on the tangent at the point, is equal to $n\theta$: and hence determine the equation of the *pedal* of the curve, with respect to the origin.

DR. TRAILL.

6. Find the attraction of a circular plate on a point on an axis perpendicular to its plane through its centre, if the force vary inversely as the square of the distance.

7. Investigate the law of force, in order that a body may describe a logarithmic spiral.

8. (a). If the polar equation of a curve be

$$r = a \sec^2 \frac{\theta}{2},$$

find an expression for the radius of curvature.

(β). Find the evolute of the curve

$$p^2 = r^2 - a^2.$$

9. Find the values of the following integrals:—

$$\int \frac{du}{(1-u)\sqrt{1+u}} \text{ and } \int \frac{du}{(1+u)\sqrt{1+u^2}},$$

10. Find the law of the variation of the unit of mass of a catenary acted on by gravity, that it may hang in the form of a semicircle with its diameter horizontal.

MR. PANTON.

11. A heavy string of uniform density and thickness is suspended from two given points; find the equation to the curve in which the string hangs when it is in equilibrium.

12. A uniform rectangular board is placed upon a rough inclined plane. If the inclination of the plane to the horizon is gradually increased, find whether the equilibrium of the board will be disturbed by the commencement of a rolling or of a sliding motion.

13. Find the centre of gravity of the portion of a parabola bounded by an ordinate, the axis, and the curve.

14. Find the nature of the double point of the curve

$$y^3 = (x-2)^2(x-5).$$

Find for the same curve the co-ordinates of the two real finite points of inflexion, and show that they subtend a right angle at the double point.

15. Find the whole area of the limaçon

$$r = a + b \cos \theta.$$

B.

MR. WILLIAMSON.

1. A weight W , lying on a table, is connected with another W' by an inelastic string passing over a pulley directly over W . If W' fall through a height h before the string becomes tight, determine the impulsive tension of the string, and the initial velocity of W .

2. Being given the initial velocity and direction of a projectile, determine the velocity with which it strikes a given oblique plane, and also the direction of its motion at the instant of impact.

3. Find the values of the integrals

$$\int \frac{dx}{\sin^2 x (a + b \cos x)}, \quad \int \frac{(1-x^2) dx}{(1+x^2) \sqrt{1+x^2+x^4}}.$$

4. If A denote the whole area of a loop of the closed curve

$$r^m = a^m \cos m\omega,$$

and A_1 the area of its *pedal* with respect to the origin, prove that

$$A_1 = \left(1 + \frac{n}{2}\right) A.$$

5. If V be a function of r , where $r = \sqrt{x^2 + y^2 + z^2}$, prove that

$$\frac{d^2 V}{dx^2} + \frac{d^2 V}{dy^2} + \frac{d^2 V}{dz^2} = \frac{d^2 V}{dr^2} + \frac{2}{r} \frac{dV}{dr}.$$

DR. TRAILL.

6. A number of uniform planks of equal size rest on a series of rough horizontal cylinders, the directions of each plank and corresponding cylinder being at right angles. If each plank be slightly displaced, so as always to remain in contact with the cylinder without sliding, and if T_1, T_2, T_3 , &c., be the respective periods of an oscillation of the planks, and if t_1, t_2, t_3 , &c., be the respective periods of an oscillation of simple pendulums equal in length to the radii of the cylinders, prove that

$$T_1 t_1 = T_2 t_2 = T_3 t_3, \text{ \&c.}$$

7. A particle, projected in a given direction with a given velocity, and attracted towards a given centre of force, has its velocity at every point to the velocity in a circle at the same distance as 1 to $\sqrt{2}$; find the orbit described, and the law of force.

8. A material particle moves under the influence of two centres of force, varying directly as the distance, one being attractive, and the other repulsive; find the path described by the particle.

$$9. \text{ If } u = x \sqrt{a^2 - y^2} \sqrt{a^2 - z^2} + y \sqrt{a^2 - x^2} \sqrt{a^2 - z^2} \\ + z \sqrt{a^2 - x^2} \sqrt{a^2 - y^2} - xyz,$$

prove that

$$-\frac{d^3 u}{dx dy dz} = \frac{\frac{du}{dx}}{\sqrt{a^2 - y^2} \sqrt{a^2 - z^2}} = \frac{\frac{du}{dy}}{\sqrt{a^2 - x^2} \sqrt{a^2 - z^2}} = \frac{\frac{du}{dz}}{\sqrt{a^2 - x^2} \sqrt{a^2 - y^2}}$$

10. Find the values of

$$\int \frac{dx}{1 - x^4} \quad \text{and} \quad \int \frac{dx}{1 - x^6}.$$

MR. PANTON.

11. A particle moves under the action of a central force varying inversely as the cube of the distance; show that its distance from the centre of force at any moment is given by an equation of the form

$$r^2 = A + Bt + Ct^2;$$

and find the values of A , B , and C in terms of the initial distance, the velocity, and angle of projection.

What condition is necessary that the orbit should have an apse, and after what time from the commencement of the motion will the apse be reached?

12. A heavy particle is projected vertically upwards in an atmosphere whose resistance varies as the square of the velocity; given the velocity of projection, find the velocity of the particle when it returns to the point of projection.

13. Find the equation whose roots are the maxima and minima values of the expression

$$\frac{ax^3 + 3bx^2y + 3cxy^2 + dy^3}{a'x^3 + 3b'x^2y + 3c'xy^2 + d'y^3}.$$

14. Prove that the whole length of the limaçon $r = a + b \cos \theta$ is equal to twice the perimeter of the ellipse whose axes are equal in length to the distances of the double point of the curve from its two other points of intersection with the axis.

15. Find the integrals

$$\int x^n (\log x)^2 dx, \quad \int \frac{x^2 dx}{x^4 + x^2 - 2}.$$

C.

LIMITED COURSE.

MR. WILLIAMSON.

1. A ladder of 25 ft. length rests against a smooth wall, the foot of the ladder being 7 ft. from the wall; find the pressure against the wall, the weight of the ladder being 70 lbs., and its centre of gravity 6 ft. from its lower end.

2. Find the least pressure parallel to the plane, which will prevent a mass of 112 lbs. from sliding down an inclined plane; the angle of inclination being 30° , and the coefficient of friction $\frac{1}{4}$.

3. Prove that the path of a projectile *in vacuo* is a parabola, and that the velocity at any point is that acquired by a body in falling from the directrix.

4. A force producing a uniform pressure of 40 lbs. acts during one minute on a mass of 112 lbs.; find the velocity generated by the force.

5. A mass of 56 lbs., moving at the rate of 15 miles an hour, overtakes a mass of 40 lbs., moving at the rate of 5 miles an hour; if both masses be perfectly elastic, find their velocities after the collision.

6. A railway carriage of 1 ton weight is moving at the rate of 30 miles an hour around a curve of 800 ft. radius; find the centrifugal pressure on the rails.

DR. TRAILL.

7. If $abcd$ be any rectangle, and P any point, and if Q be another point, such that aP is equal and parallel to cQ (a and c being opposite corners of the rectangle), prove that PQ represents in magnitude and

direction the resultant of the forces represented by the perpendiculars from P on the sides of the rectangle.

8. A body slides down a smooth inclined plane, and flies off into space; show that the distance of the focus of the parabola then described, from the extremity of the plane whence the body flew off, is equal to the vertical height descended by the body while in contact with the inclined plane.

9. A particle is projected with a velocity $5g$ up a plane, which is inclined at an angle of 30° to the horizon; find the interval of time which has elapsed, when its distance from the starting point is $9g$.

10. If parallel forces act at the angles of a triangle whose sides are a, b, c , find the centre of the parallel forces if they be

- (1) proportional to $a \cos A, b \cos B, c \cos C$,
and (2) proportional to $a \sec A, b \sec B, c \sec C$.

11. A uniform beam, 12 ft. in length, is carried by two men; the beam weighs 100 lbs., and a weight of 60 lbs. is suspended from a point 4 ft. from one end, which rests on one man's shoulder. Find where the other man should place his shoulder, so as to bear an equal share of the whole weight.

12. A body placed on a horizontal plane requires a horizontal force equal to its own weight to overcome the friction; if the plane be gradually raised at one end, find at what angle the body will begin to slip.

MR. PANTON.

13. A square is divided into sixteen equal squares by lines parallel to the sides, and one of the parts is removed from a corner. Find the position of the centre of gravity of the remaining figure.

14. A heavy triangle ABC is suspended successively from the angles A and B ; if the two positions of any side are at right angles to each other, prove that

$$5c^2 = a^2 + b^2.$$

15. A uniform beam rests with one end on a smooth horizontal plane, and the other on a smooth inclined plane, in such a position that the two extremities of the beam are equally distant from the intersection of the planes. If it is kept in equilibrium by a string attached to the intersection of the planes and the lower extremity of the beam, find the tension of the string, the weight of the beam and the inclination of the plane being given.

16. The absolute unit of force is defined as that force which, acting on 1 lb. of matter for one second, generates a velocity of 1 ft. per second. Find how many such units are contained in the centrifugal force of a mass of 20 lbs. revolving in a circle of 10 ft. radius, with a velocity of one mile per minute.

17. A seconds pendulum is taken to the top of a mountain two and a-half miles high; how many beats will it lose in a day?

18. A stone is let fall from a point, and in a given time after a second stone is projected vertically downwards from the same point with a given velocity; find after what time the second stone will overtake the first.

Classics.

THUCYDIDES.

MR. POOLE.

Translate the following passages into English prose:—

1. *Beginning*, τοὺς τε λόγους ὅστις διαμάχεται μὴ, κ. τ. λ.
Ending, οὐχ ὅπως ζημιοῦν ἀλλὰ μὴδ' ἀτιμάζειν.
2. *Beginning*, ὅσα γὰρ εἰς ἀνάγκην ἀφίεται ὥσπερ τάδε, κ. τ. λ.
Ending, αὐτοὺς καὶ τὸ χωρίον.
3. *Beginning*, φημὶ γὰρ ὑμᾶς πολεμίους πολλοὺς, κ. τ. λ.
Ending, τὰς ἡπειρούς ἐνδοιαστῶς ἀκροῶνται.
4. *Beginning*, ξυμπεσουσῶν δὲ ἐν ὀλίγῃ πολλῶν νεῶν, κ. τ. λ.
Ending, οἱ κελευσταὶ φθέγγονται παρέχουσιν.

1. Write an explanatory note on the last clause in the first passage.

2. Περικλῆς δὲ λαβὼν ἐξήκοντα ναῦς ἀπὸ τῶν ἰσφορμουσῶν ᾤχετο κατὰ τάχος ἐπὶ Καύνου καὶ Καρίας, ἰσαγγεληθέντων ὅτι Φοινίσσαι νῆες ἐπ' αὐτοὺς πλείουσιν· ᾤχετο γὰρ ἐκ τῆς Σάμου πέντε ναυσὶ Στρησαγόρας καὶ ἄλλοι ἐπὶ τὰς Φοινίσσας.

(a). Translate this passage accurately, noticing its grammatical irregularity.

(b). To what historical occurrences does the passage refer?

3. καὶ οὕτως οὐ πόλεμος πολέμῳ, εἰρήνῃ δὲ διαφοραὶ ἀπραγμόνως παύονται, οἳ τ' ἐπικλητοὶ εὐπρεπῶς ἀδικοὶ ἐλθόντες ἐυλόγως ἀπρακτοὶ ἀπίασι.

(a) Translate this passage, and explain the connexion of the words in the last clause.

(b). What was the policy urged by Hermocrates in the speech of which this passage forms part.

4. In the speech of Pericles at the close of the first book, Thucydides makes him warn the Athenians against the policy which afterwards caused them so great losses?

5. What is Thucydides' account of the campaign in Egypt; and what was its date.

6. Notice some occasions on which the small number of the citizens at Athens and Sparta led to very important consequences, in their wars.

7. How did the Mitylenæans argue that they were not really guilty of a breach of faith in joining the Spartans?

8. Grote points out the striking contrast of the characters of Pericles left by Thucydides and Plutarch? and how far can these be reconciled according to him?

TACITUS.

MR. ABBOTT.

Translate the following passages into English :—

1. *Beginning*, Dein ceteri composita indignatione,
Ending, cum belli civilis praemia festinarentur. *Hist.*, iii. 37.
2. *Beginning*, Si status imperii aut salus Galliarum
Ending, naturam contra interpretabatur. *Ibid.*, iv. 85, 86.
3. *Beginning*, Tum primum e campo comitia ad patres translata sunt :
Ending, utque per circum triumphali veste uterentur. *Ann.*, i. 15.
4. *Beginning*, Nemo enim illic vitia ridet, nec corrumpere
Ending, quia periculosiores sunt inimicitiae iuxta libertatem. *Germania*, 19, 21.

-
1. Write a critical estimate of Tacitus (*a*) as a historian, (*b*) as regards his Latin style. The latter betrays the influence of his Greek studies?
 2. What are the periods covered by the Annals and the Histories respectively. What other authorities have we for the same period?
 3. Mr. Merivale explains certain phenomena in the history of the Latin language, from the fact, that it is of older formation than Greek. Explain this statement, and the method by which it is proved.
 4. Give some account of the disaster to the Romans with which the name of Arminius is associated.
 5. What are the several data which we possess for the estimation of the population of Rome in imperial times.
 6. What was the nature of the contents of Augustus's "Breviarium Imperii?"
 7. Mr. Merivale draws attention to several characteristics in which the Roman and Athenian institutions agreed. State these.

MR. MAHAFFY.

GREEK PROSE.

In opposition to the implacable governing party, which eagerly but patiently waited for an opportunity of overthrowing him, he had to seek support among the citizens; and although their leaders might be ever so pure and noble, the multitude was deeply corrupt, and accustomed by

the unhappy system of corruption to give nothing without being paid for it. In particular emergencies, indeed, necessity or enthusiasm might for the moment prevail, as everywhere happens even with the most venal corporations; but, if Hamilcar wished to secure the permanent support of the Carthaginian community for his plan, which at the best could only be executed after a series of years, he had to supply his friends at home with regular consignments of money as the means of keeping the mob in good humour.—MOMMSEN.

GREEK IAMBICS.

What *is* my trespass? what *is* my sin that thou hast so hotly pursued after me?

Whereas thou hast searched all my stuff, what hast thou found of all thy household stuff? set *it* here before my brethren and thy brethren, that they may judge betwixt us both.

This twenty years *have* I *been* with thee; thy ewes and thy she goats have not cast their young, and the rams of thy flock have I not eaten.

That which was torn *of beasts* I brought not unto thee; I bare the loss of it; of my hand didst thou require it, *whether* stolen by day or stolen by night.

Thus I was; in the day the drought consumed me, and the frost by night; and my sleep departed from mine eyes.

Thus have I been twenty years in thy house; . . . and thou hast changed my wages ten times.

GENESIS.

LATIN PROSE.

Hannibal, well served by his spies in Rome and in the Roman army, immediately learned how matters stood, and, as usual, adjusted the plan of his campaign in accordance with the individual character of the opposing leader. Passing the Roman army, he marched over the Apennines into the heart of Italy towards Beneventum, took the open town of Telesia on the boundary between Samnium and Campania, and thence turned against Capua, which was the most important of all the Italian cities dependent on Rome, and for that very reason had been oppressed and maltreated in a more vexatious manner than any other community had been by the Roman government. He had formed connections there, which led him to hope that the Campanians might revolt from the Roman alliance; but in this hope he was disappointed.—MOMMSEN.

LATIN VERSE.

Friendship, begun in unexperienced youth,
 In honour founded, and secured by truth,
 In distant climes and various fortunes tried,
 Not death, the grand destroyer, can divide.
 True to thy honest fame, which long shall live,
 This last just tribute to thy worth I give:

A humour pleasing, and a wit refined,
 Knowledge and judgment clear, enriched your mind;
 In you to full perfection met the powers
 Which sweeten and adorn the social hours.
 In Fancy's flowery gardens when you strayed,
 If you invoked the Muse she gave her aid:
 Nor covetous nor negligent of fame,
 You've gained a fair—deserved a lasting name.

POPE.

Metaphysics.

MILL ON HAMILTON.

DR. STUBBS.

1. What is Sir W. Hamilton's threefold division of Cosmothetic Idealists?
2. State clearly the difference between Hamilton and Reid with respect to Consciousness and Memory.
3. What objection is there to the proof of the trustworthiness of Consciousness from the Veracity of the Creator? How does Hamilton avoid this defect?
4. What does Mill mean by the psychological as distinguished from the introspective mode of inquiry into the mental phenomena?
5. What is the really important difference between Brown and Hamilton on the subject of Perception?
6. What is Mansel's reply to Mill's retort upon Hamilton, when he asserts that we cannot be conscious of a mental operation without being conscious of its object?

 DR. TARLETON.

1. How does Mr. Mahaffy describe the nature of Kant's Transcendental Proof? and show that it is not illogical.
 How is Transcendental Knowledge defined?
 How does Transcendental Æsthetic differ from Mathematics?
2. Mention the different senses in which the word Metaphysic is used by Kant?
 In what sense is the science of Metaphysic illegitimate, and how is this illegitimacy proved?
3. State the difference between the Metaphysical and the Transcendental Exposition of Space and Time, and show how by each method the nature of these representations is determined.
4. What is meant by the Empirical Reality and the Transcendental Ideality of Space and Time.

How does Kant show that Transcendental Ideality cannot be illustrated by means of secondary qualities?

5. Show that the Ego is presented only as a phenomenon.

6. How does Mr. Mahaffy show that the Law of Inseparable Association cannot be regarded as ultimate, and can be best accounted for on the principles of Kant?

7. To what does Mr. Mahaffy consider that Objective Necessity should be confined originally?

What does he mean by Objective Necessity?

Two passages quoted by him show that a different meaning was attributed to it by Kant?

8. How does Mr. Mahaffy show that the Association School does not satisfactorily describe the nature and origin of Mathematics?

MILL'S EXAMINATION OF HAMILTON, CHAP. XI.—XIV.

DR. SHAW.

1. "It is not with sensations as actually experienced," says Mill, "but with their permanent possibilities, that the idea of Cause comes to be identified." By what considerations does he arrive at this thesis and the two which accompany and develop it?

2. The law of Inseparable Association is that, "not only does the idea called up by association become in our consciousness inseparable from the idea which suggested it, but the facts or phenomena answering to those ideas come at last to seem inseparable in existence." On Mill's system the facts or phenomena in question are themselves nothing but sensations. Discuss the question, then, whether the above law is anything else than an identical proposition.

3. Discuss the question whether Mill, in his psychological theories of the external world, has done anything else but show that the reality of that world (in the sense attached to the word reality by Reid and Hamilton,) is made known to us gradually by experience, instead of, as they thought, instinctively.

4. By what two steps does Mill account for the common illusion that our belief in matter is something more than a belief in the permanent possibilities of sensation.

5. Definition of mind on the psychologic theory?

6. Mill's explanation of the conception of one group of possibilities of sensation destroying or modifying another group consists of two steps. What are they?

7. Give the heads of Mr. Bain's theory of the origin of our idea of Extension.

8. Give Mr. Mahaffy's summary of objections to this theory, and Mr. Mill's replies.

9. What support or opposition does the theory receive from the facts reported by Plattner, Franz, and other philosophic observers of the blind?

10. Parallel lines, if sufficiently long, do seem to include a space. Tangents do seem to touch circles in more than one mathematical point. Mill does not seem to have made all the use that he might have made of these and similar facts, in his controversy with Intuitionists respecting necessary judgments.

Experimental Physics.

MR. LESLIE.

1. Prove that the acceleration due to gravity is

$$g = g_0 (1 - 0.00256 \cos 2\lambda) \left(1 - \frac{2h}{R} \right),$$

and state the mode of determining the numerical coefficient by experiment.

2. Show how it follows from the third law of motion that when two weights are connected by a string passing over a pulley the acceleration is

$$f = \frac{P - Q}{P + Q} \cdot g.$$

- (a). State the mode of verifying this by experiment.

3. Describe the various modes of verifying Boyle's law of pressures by experiment.

Apply the law (a) to the graduation of a compressed air manometer; (b) to determine the effect of inclosed air on the height of a barometer.

4. Explain the various corrections for a mountain barometer, and the principle of the vernier.

How is a syphon barometer graduated by a dividing machine?

5. Deduce the metric formulæ (a) for the weight of dry air; (b) for the relative volume of steam.

6. Find the density of moist air.

15.6 cubic inches of electrolytic gas are collected over water at 50° F., the pressure is 29.4, and the tension of the vapour 0.36; calculate the weight of dry gas.

7. Show how to allow for the effect of the air upon the apparent weight of bodies, and calculate the true weight of a gallon of water.

8. Show how to find the constants of a specific gravity bottle.

84.36 grains of a mineral are introduced into a bottle whose constants are

$$a = 0.61, \quad w = 500.72, \quad c = 251.60.$$

When filled with water the weight is 542.73; find the specific gravity of the mineral.

9. Spirit containing 77.09 per cent. of alcohol by weight has at 60° F. a sp. gr. 0.8555; the sp. gr. of absolute alcohol is 0.7946; determine the percentages of alcohol and water by volume.

10. Determine generally what quantity of a weaker spirit must be added to a stronger one to produce a spirit of a given mean percentage.

MR. CATHCART.

1. How may the rise in temperature of a projectile whose specific heat is (c) striking a target with velocity (v) be calculated—the heat of percussion being equally shared by both bodies?

2. Weight in vacuo of a solid is w .

Weight in a fluid at t_0° whose sp. gr. is s_0 is w_0 .

Weight in same fluid at t_1° whose sp. gr. is s_1 is w_1 ,

What is the cubical expansion of the solid between these temperatures?

3. How many litres do 120 grammes of dry air occupy at 15° under a pressure of 22 atmospheres?

4. State any empirical relation between the elastic force of water vapor and the temperature, also the experiments by which it has been verified.

5. Pouillet's method of determining high temperatures by the air thermometer is faulty. How has this been since remedied?

6. Describe Favre and Silbermann's calorimeter. How is it graduated?

7. What relations exist between the absorbing, reflecting, and radiating powers of the same body? Illustrate by experiments.

8. On what principles has the formula for the wet and dry bulb hygrometer been established?

9. 1 lb. hydrogen burning in pure oxygen disengages 34,462 units of heat and forms 9 lbs. of steam. What is its temperature if no heat be lost?

10. How did Wiedemann and Franz experiment on conductivity? Arrange in order of decreasing conductivities the metals—copper, gold, iron, lead, platinum, silver, tin, zinc.

Modern History.

PROFESSOR DOWDEN.

1. Give Lingard's account of Alfred's

(a). Measures of defence against the Danes.

(b). Improvements in the administration of justice.

(c). Apportionment of the finances.

d

2. Write notices of
 - (a). Turketul.
 - (b). Stigand.
 - (c). Edric.
3. To what, in the opinion of Lingard, is the peaceful reign of Edgar to be ascribed?
4. Lingard selects some interesting particulars from the laws of Canute.
5. Give an account of the invasion of England by Alfred in Harold's reign, and discuss the question of Godwin's guilt with respect to the murder of Alfred.
6. Describe the Battle of Stamford Bridge.
7. Give some account of the slaves among the Anglo-Saxons, and of their condition.
8. Write explanatory notes on the following enactment of Magna Charta: "*No sheriff, constable, coroner, or other of our bailiffs, shall hold pleas of the Crown.*"
9. Notice the most important alterations,—omissions and additions—to the Great Charter as renewed and confirmed by Henry III. and subsequent kings.
10. (a). How far is trial by jury recognised in the Great Charter?
 (b). What are the theories maintained respecting the origin of trial by jury?
 (c). In Normandy how were criminal charges tried?
 (d). Palgrave remarks, that in the system of Saxon jurisprudence the criminal trial was "of the nature of an arithmetical calculation, or a chemical experiment."

MR. BARLOW.

1. Relate anything you know of the life of Blanche of Castile. Joinville tells a curious story, characteristic of her arbitrary conduct, and sufficiently derogatory to Louis IX.?
2. Write a note on the system of "appanages" in France.
3. Give Joinville's description of the River Nile. What information respecting the military engines of the thirteenth century may be derived from his memoirs?
4. "In 1192 Rome imitated the prevailing fashion by the appointment of an annual foreign magistrate"?
5. Give some account of John of Procida.
6. On what grounds does Hallam assert that "the Germanic constitution may be reckoned complete, as to all its essential characteristics, in the reign of Maximilian I."?
7. The transactions which brought Scotland proper, Strathclyde, and Lothian into their relations to one another and to the English crown, were quite distinct. Explain these.

8. An early precedent for ship-money has been found in a vote of the Witan in 1008. What is the entry in the A. S. Chronicle for that year? How has it been explained? Point out the essential differences between this ship-money and that levied by Charles I.

9. Whence does it appear that, in the reign of Henry III., the present rules of succession to the throne had not been established? Hallam refers to a passage which shows that, even in the reign of Edward III., the succession was supposed to be confined to the male line?

10. Sir Matthew Hales asserts of an assembly which met only four years after the Conquest, that it was "as sufficient and effectual a parliament as ever was held in England." What is Hallam's opinion?

11. The practice of leaving statutes to be drawn up by the judges, from the petition and answer jointly, after dissolution of parliament, presented an obvious opportunity of falsifying the intention of the legislature. Hallam gives some instances of this fraud?

12. "Villenage had a double sense, as it related to persons or to lands"? Distinguish between villeins regardant, and villeins in gross. What were the principal means by which a large proportion of the peasantry had become hired labourers instead of villeins, before the middle of the fourteenth century?

Modern Literature.

ENGLISH LITERATURE.

PROFESSOR DOWDEN.

1. Write a notice of the influence of the Celt on the English language and English literature.

2. Make a table of fourteenth century English literature, throwing the literature, prose and verse, into such classes as seem convenient. Affix dates.

3. How does the grammar of Chaucer differ from that of the present day in the case of

- (a) nouns,
- (b) adjectives,
- (c) verbs?

4. Give a metrical analysis of the following lines:—

- (a). "That on his schyne a mormal hadde he."
- (b). "To ryden out, he lovede chyvalrye."
- (c). "Ech man for himself ther is non other."
- (d). "In prisoun? Certes, nay, but in paradys."
- (e). "Biforn me sorweful wreeche creature."

5. Write explanatory notes on the following passages:—

- (a). "He was a jangler and a golyardeys."

- (b). "And in his geere, for al the world he ferde
Nought oonly lyke the lovers maladye
Of Hereos, but rather like manye
Engendred of humour melancolyk,
Byforen in his selle fantasyk."
- (c). "And therout came a rage and such a vese
That it made al the gates for to rese."
- (d). "Daun Burnel the asse."
- (e). "Then vas he vounder will of vayn."
- (f). "To leue nam I nout lees."
- (g). "Mody meneþ, so doþ mo,
Ichot ycham on of þo,
For loue þat likes ille."
- (h). "That oþer coffre, of straw and mull
Wiþ stones meined, he felde also."
- (i). "Crist, that is to every harm triacle."
- (j). "O Mars, O Atazir!"
6. (a). How is the Palmer described in "Piers the Plowman," Passus vi.?
- (b). How, according to Sir John Mandeville, came the ten tribes the Jews to be enclosed between the mountains of Caspye, and how are they to be delivered?
- (c). What is Gower's "Tale of the Coffers"?

MR. PALMER.

1. What is the morphological classification of languages commonly adopted? Illustrate the principle on which this classification is founded.
2. There are at least two reflexive verbs in English borrowed from the Scandinavian dialects?
3. Why is it wrong to consider English a romance language?
4. What are the analogues, according to Grimm's law, of the following words, in the languages to which that law applies: *goose, waggon, tooth, water, fare, thirst, queen*.
5. To what cause is phonetic decay within a language attributable? Give instances in Latin, Greek, and English.
6. What do you observe peculiar in the composition of the following words:—*oddity, talkative, falsehood, unstable, bishopric*?
7. Discuss the influence of accent in the changes which English words have undergone.
8. Give the derivation of the following words:—*constable, sheriff, gossip, proxy, story*.
9. Give some account of Sir Thomas Malory and of the different editions of the *Morte d'Arthur*.

10. Write notes on the following :—

- a. With a great multitude of ships, *cogges* and *dromons*.
- b. All this was made in great books, and put in *almeries* at Salisbury.
- c. There he heard the *waits* upon the walls.
- d. Many clubs of iron and *gisarms* about him.
- e. Castle *orgulous*.

11. 'I heard the water lapping on the crag.'—Tennyson. What is in the original?

12. Relate any story in the *Morte d'Arthur*, not yet treated by the Laureate, which you consider well suited to form the groundwork of a poem.

13. Relate the story of Pelleas. Mr. Tennyson's introduction to it seems taken from another story?

FRENCH.

DR. ATKINSON.

1. Translate and criticise the following passages (words, phraseology structure, position, &c.) :—

- (a). Don Rodrigue *surtout*, n'a trait en son visage qui d'un homme de cœur ne soit la *haute* image.
- (b). on l'a pris tout *bouillant de sa querelle*.
- (c). son sang sur la poussière écrivait mon devoir.
- (d). un moment donne au sort des visages divers.
- (e). hélas ! *ton intérêt* ici me désespère.
- (f). et contre ma douleur j'aurais senti des charmes.
- (g). son sang crierait vengeance, et je ne l'orrai pas !
- (h). (ce cher objet) ne peut pour mon supplice avoir trop de colère.
- (i). et ta beauté sans doute emportait la balance, à moins que d'opposer à tes plus forts appas qu'un homme sans honneur ne te méritait pas.
- (j). de quoi qu'en ta faveur notre amour m'entretienne ma générosité doit répondre à la tienne.
- (k). va, je suis ta partie, et non pas ton bourreau.
- (l). tous mes sens à moi-même en sont encor charmés.
- (m). non, j'ai peint votre cœur dans une indifférence qui n'enfle d'aucun d'eux, ni n'abat l'espérance.

2. Corneille's use of these words and phrases :—

résoudre : s'engager : funérailles : je dois : du tout : impitoyable : intéressée : résister : au besoin : désespère : courage : pencher : croître : quitter l'envie : tant que j'expire : même soin : pencher : dedans.

- (b). Quote any lines in which Corneille uses the words—
offenseur : vaincu : bonace : rendre combat : teinture :
brigue : amorce : embrasé.
- (c). Is the following line grammatically correct?
De n'examiner rien quand un roi l'a voulu.
- (d). "Scuderi a marqué huit passages où Corneille parle de lauriers,
et il lui en fait un crime?"
"Ce vers excellent renferme toute la pièce, et répond à toutes
les critiques qu'on a faites sur le caractère de Chimène?"
State what you know in reference to these remarks.
3. Write out any three tirades of Racine, Molière, or Corneille.
4. Racine has parodied many single lines and scenes of Corneille?
5. Analyse the scenes of *Le Cid* [or *Le Tartuffe*], so as to show the
action of the hero in each scene.
6. Show, similarly, the action of the heroine in *Athalie* [or *Le Mis-
anthrope*].
7. Give the substance of the remarks of the author in the preface
[placet] to *Le Cid* [or *Le Tartuffe*].
8. Translate :—
- (a). Il n'a garde de prendre aucune ombre d'ennui
de tout ce qui n'est pas pour dépendre de lui.
- (b). il ne fait pas bien sûr, à vous le trancher net,
d'épouser une fille en dépit qu'elle en ait.
- (c). et je baise les mains à qui ne me veut pas.
- (d). je n'y puis que faire.
- (e). nous l'avons en dormant, madame, échappé belle.
- (f). allez philosopher tout le soûl avec elle.
- (g). (il) en fait le plus souvent les martyrs de ses veilles.
- (h). de pas mis avec rien tu fais la récidive.
9. Quote and translate any lines of Molière, in which the following
words occur:—Appas : marmot : essor : rebut : logis : truche-
mens : faux-fuyant : épuré : repartir : fredaines : gourment :
épluchant : rate : rabats : brimborions : rôl : billevesées.
10. Compare *les fem. sav.* with *les prec. rid.*, showing the use Molière
made in the former of (a) the words, phrases &c., (b) the con-
trasts of character, (c) the plot—of the latter. (Write out as
many passages as possible in illustration).

[Questions 8—10 may be substituted for 1—3].

Translate the following passage, and give the etymology of every word in the last ten lines :—

Dans un des parvis aux hommes réservé,
 Cette femme superbe entre, le front levé,
 Et se préparait même à passer les limites
 De l'enceinte sacrée ouverte aux seuls lévites.
 Le peuple s'épouvante, et fuit de toutes parts.
 Mon père....Ah ! quel courroux animait ses regards !
 Moïse à Pharaon parut moins formidable.
 "Reine, sors, a-t-il dit, de ce lieu redoutable,
 D'où te bannit ton sexe et ton impiété.
 Viens-tu du Dieu vivant braver la majesté ?"
 La reine alors, sur lui jetant un œil farouche,
 Pour blasphémer sans doute ouvrait déjà la bouche :
 J'ignore si de Dieu l'ange se dévoilant
 Est venu lui montrer un glaive étincelant :
 Mais sa langue en sa bouche à l'instant s'est glacée,
 Et toute son audace a paru terrassée ;
 Ses yeux, comme effrayés, n'osaient se détourner ;
 Surtout, Eliacin paraissait l'étonner.

Racine.

GERMAN.

MR. BARLOW.

1. Translate the following passages—

(a). "Welche Schauer flossen nun durch die Seele Barfüsseles, wie sie nun so da sass, sie, die allzeit Dienende, nun bedient, und in der That fast wie verzaubert. Sie fürchtete sich fast vor dem Tanze, sie war jetzt so gut und so freundlich behandelt—wer weiss wie sie herumgestossen wird, und Keiner sieht nach ihr um, und all ihr äusserer Schmuck und ihre innere Lust ist vergebens ! Nein ! sagte sie vor sich hin, und wenn ich weiter nichts habe, als dass ich mich gefreut habe, das ist nun genug ; und wenn ich mich gleich wiederum ausziehen und daheim bleiben müsste, ich wäre schon glücklich. Die Bäuerin kam mit dem Schmucke, und das Lob des Schmuckes und Schimpfen auf die Heiligenpfliegerin, die einem armen Mädchen solche Blutzinsen abnehme, gieng seltsam durcheinander. Sie versprach, noch heute das Darlehen zu bezahlen und es Barfüssele allmählig am Lohne abzuziehen. Jetzt endlich durfte sich Barfüssele betrachten. Die Frau hielt ihr selber den Spiegel vor, und aus den Mienen Beider glänzte es und sprach es wie ein jauchender Wechselgesang der Freude. Ich kenn' mich gar nicht ! ich kenn' mich gar nicht ! sagte Barfüssele immer und betastete sich auf und nieder mit beiden Händen im Gesicht. Ach Gott, wenn nur mein' Mutter mich so sehen könnte ! Aber sie wird Euch gewiss vom Himmel herab segnen, dass Ihr so gut zu mir seid, und sie wird Euch beistehen in der schweren Stunde ; brauchet nichts zu fürchten. "Jetzt mach' aber ein ander Gesicht," sagte die Bäuerin, "nicht so ein Gotteseerbarm ; aber es wird schon kommen, wenn du die Musik hörst." "Ich mein', ich höre sie schon," sagte Barfüssele. "Ja, horchet, da ist sie." In der That fuhr eben ein grosser Leiterwagen mit grünen Reisern besteckt

durch das Dorf und darauf sass die ganze Musik, und der Krappenzacher stand mitten zwischen den Musikanten und blies die Trompete, dass es schmetterte.“—AUERBACH.

- (b). “Seht Ihr, sagt’er, das Mädchen? Sie hat die Puppe gewickelt, Und ich erkenne genau den alten Cattun und den blauen Kissenüberzug wohl, den ihr Hermann im Bündel gebracht hat. Sie verwendete schnell, fürwahr, und gut die Geschenke. Diese sind deutliche Zeichen, es treffen die übrigen alle; Denn der rothe Latz erhebt den gewölbten Busen, Schön geschnürt, und es liegt das schwarze Mieder ihr knapp an; Sauber ist der Saum des Hemdes zur Krause gefaltet, Und umgiebt ihr dass Kinn, das runde, mit reinlicher Anmuth; Frei und heiter zeigt sich des Kopfes zierliches Eirund, Und die starken Zöpfe um silberne Nadeln gewickelt: Sitzt sie gleich, so sehen wir doch die treffliche Grösse, Und den blauen Rock, der, vielgefaltet, vom Busen Reichlich herunterwallt zum wohlgebildeten Knöchel. Ohne Zweifel sie ist’s. Drum kommet, damit wir vernehmen, Ob sie gut und tugendhaft sey, ein häusliches Mädchen.”

GOETHE.

(c). “Elisabeth gehörte zu den Fürsten, die sich im Voraus über die Pflichten der Regierung einen Begriff gebildet haben. Vier Eigenschaften, sagt sie einmal, seien ihr dazu nothwendig erschienen: Gerechtigkeit und Mässigung, Grossmuth und Urtheil:—der beiden ersten dürfe sie sich rühmen: nie habe sie bei gleichem Recht Einen vor dem Andern begünstigt: nie habe sie einem ersten Bericht geglaubt, sondern bis zu voller Kenntniss an sich gehalten:—die beiden andern wollte sie sich nicht anmassen, denn es seien Tugenden der Männer. Eben diese aber schrieb ihr die Welt in hohem Grade zu. Ihr feines Urtheil erblickte man in der Wahl ihrer Diener und der Verwendung derselben zu solchen Diensten, zu denen sie eben am geschicktesten seien. Ihre Hochherzigkeit sah man in der Verachtung kleiner Vortheile, und ihrem unerschütterlichen Gleichmuth in der Gefahr. Während des aus Spanien daherziehenden Ungewitters habe man keine Wolke auf ihrer Stirn gesehen: durch ihre Haltung habe sie Adel und Volk belebt, ihre Räthe beseelt. Man rühmte an ihr beides: eifrige Theilnahme an der Berathung und Sorgfalt, dass das Beschlossene ins Werk gesetzt werde.—RANKE.

2. Translate into German:—

“The journey from Ghent to Antwerp was easy, and he was agreeably surprised by the apparent prosperity of the country. At intervals of every few miles, he was refreshed with the spectacle of a gibbet well garnished with dangling freebooters, and rejoiced therefore in comparative security. For it seemed that the energetic bailiff of Waasland had levied a contribution upon the proprietors of the country, to be expended mainly in hanging brigands, and so well had the funds been applied, that no predatory bands could make their appearance, but they were instantly pursued by soldiers, and hanged forthwith without judge or trial. Cecil counted twelve such places of execution on his road between Ghent and Antwerp.—MOTLEY.

3. Describe (a) the first, (b) the second meeting of Hermann and Dorothea. Give quotations wherever you can.

4. A passage in this poem indicates Goethe's opinion as to the advantages of ecclesiastical interference with the civil government?

5. "Immer verdank' ich es doch in solch unruhiger Stunde
 Meinem seligen Vater, der mir, als Knaben, die Wurzel
 Aller Ungeduld ausriss, dass auch kein Fäschen zurückblieb,
 Und ich erwarten lernte sogleich, wie keiner der Weisen."
 "Sagt," versetzte der Pfarrer, "welch Kunststück brauchte der
 Alte?"

What was this "Kunststück?"

6. Explain the sentence—"Es ist gerade wie im Märlein: Tischlein deck dich!—Aber Knüppel aus dem Sack! gehört auch dazu, sagte Johannes." (Auerbach).

7. Give some German words in which different significations are indicated by difference of gender.

8. Assign the imperfect and participle, and also the signification of the following verbs—bergen, essen, keifen, ringen, rinnen, siedeln.

PROFESSOR SELSS.

1. Translate into German:—

It was early on Tuesday, the 14th of October, 1806, when the inhabitants of Weimar were roused from their sleep by the roar of cannon. The battle of Jena had commenced. The people assembled in groups in the streets; others ascended the steeples and the heights, anxious to watch the course of events. Terror reigned in the town and castle, while the birds were singing in the trees on the esplanade, as if to form a contrast to the scenes of horror which were enacted at a distance. For five hours opposite rumours prevailed. About one o'clock in the afternoon some fifty artillery-men, with blackened faces and hands, rushed through the Jena gate, and announced, by their appearance no less than by their words, that the battle was lost. Some Prussian horsemen, hanging cross-ways over their horses, because they were mortally wounded, followed close behind these, and left no doubt of the truth of the report. Soon thousands of fugitives hurried in, while the people shut their houses to prepare for the arrival of the enemy. Göthe meanwhile sat anxiously in his garden: no one but the Duchess Louise remained in the palace. The Duke Karl August led his cavalry regiment from the battle-field across the Elbe, and there heard that his capital was in the hands of Napoleon.—
 FALK ON GÖTHE.

2. Translate into English:—

Barfüssele ermahnte ihn, er solle ohne Klagen erzählen; und nun berichtete Dami eine lange Geschichte wie er es beim Ohm in America nicht ausgehalten, wie hartherzig und eigennützig der sei, besonders aber, wie ihm die Frau jeden Bissen missgönnt habe, den er im Hause genosse, wie er dann da und dort gearbeitet, aber immer mehr die Hartherzigkeit der Menschen erfahren habe. In America da könnten die Menschen einen Andren im Elend verkommen sehen, und shauen nicht nach ihm um. Barfüssele musste fast lachen, als immer wieder der

Endreim vorkam : ' Und da haben sie mich auf die Strasse geworfen.' Sie konnte nicht umhin einzuschalten : ' Ja, so bist du, du lässt dich immer werfen.'—AUERBACH.

3. Eilig fasste darauf der gute verständige Pfarrherr
 Erst des Vaters Hand und zog ihm vom Finger den Trauring ;
 Nicht so leicht, er war von rundlichem Gliede gehalten.
 Nahm den Ring der Mutter darauf und verlobte die Kinder ;
 Sprach : Noch einmal sei der goldenen Reifen Bestimmung,
 Fest ein Band zu knüpfen, das völlig gleiche dem alten.
 Also verlob' ich euch hier und segn' euch künftigen Zeiten,
 Mit dem Willen der Eltern und mit dem Zeugniß des Freundes.

GÖTHE.

4. In what universities was Göthe educated, and what is peculiar in his course of education ?

5. Give some particulars of Göthe's occupations between the years 1771 and 1775.

6. Relate the story of " Hermann und Dorothea," or of " Barfüßle."

7. Contrast the manner of Auerbach as a novelist with that of Freytag, Gutzkow, and W. Alexia.

DR. ATKINSON.

Translate the following passage into French :—

When they had taken any spoils from the enemy, the men would make a present of every thing that was rich and showy to the women whom they most admired, and would frequently dress the necks, or heads, or arms, of their mistresses, with any thing which they thought appeared gay or pretty. The women observing that the men took delight in looking upon them when they were adorned with such trappings and gew-gaws, set their heads to work to find out new inventions, and to outshine one another in all councils of war, or the like solemn meetings. On the other hand, the men observing how the women's hearts were set upon finery, began to embellish themselves, and look as agreeably as they could in the eyes of their associates. In short, after a few years' conversing together, the women had learned to smile and the men to ogle; the women grew soft and the men lively.

1. (a) What was the aim of J. du Bellay in the attempt at literary reform ?

(b) How did Ronsard attempt to carry out the programme of the *Pléiade* ?

(c) " Il faut à Ronsard, non pas un modèle, mais un calque." Expand this proposition.

(d) Quote the lines of Ronsard, beginning with

O grande Eternité !

(e) What was the " vers *baïfin* ?"

2. La tragédie chez Jodelle et ses contemporains, according to Ste.-Beuve?

3. (a) To whom are due the following characters :—Macette, Faux-Semblant, Zaïde, Céladon, Abdolonyme.

(b) "Regnier est en effet le Montaigne de notre poésie?"

(c) Both Malherbe and Regnier were literary reformers, but on very different principles?

(d) What was the action of Antonio Perez on French literature?

(e) Who were the chiefs of the Hotel de Rambouillet?

4. Write what you know of Richelieu's "brigade" of poets.

5. Draw out a list of the dramas of Molière, or Racine, or Corneille, arranging, as far as you can, chronologically.

6. (a) What was "le rôle littéraire" of Corneille?

(b) Ste.-Beuve's criticism on Corneille?

7. "Pascal a deviné la bonne comédie?"

8. Give some account of the "Princesse de Clèves?"

9. Molière critique les femmes avec amour?

10. *Tartuffe* est l'*Athalie* du théâtre comique: il en a l'à-propos comme la perfection.

Translate the following passage, and give the etymology of every word in the last ten lines:—

Il semble à trois gredins, dans leur petit cerveau,
Que pour être imprimés et reliés en veau,
Les voilà dans l'État d'importantes personnes;
Qu'avec leur plume ils font les destins des couronnes;
Qu'au moindre petit bruit de leurs productions,
Ils doivent voir chez eux voler les pensions;
Que sur eux l'univers a la vue attachée,
Que partout de leur nom la gloire est épanchée;
Et qu'en science ils sont des prodiges fameux,
Pour savoir ce qu'ont dit les autres avant eux,
Pour avoir eu trente ans des yeux et des oreilles,
Pour avoir employé neuf ou dix mille veilles
A se bien barbouiller de grec et de latin,
Et se charger l'esprit d'un ténébreux butin
De tous les vieux fatras qui traînent dans les livres.
Gens qui de leur savoir paroissent toujours iyres;
Riches, pour tout mérite, en babil importun;
Inhabiles à tout, vides de sens commun,
Et pleins d'un ridicule et d'une impertinence
A décrier partout l'esprit et la science.

Molière.

ENGLISH COMPOSITION.

PROFESSOR DOWDEN.

1. Chaucer's humour and Chaucer's pathos.
2. The mingling of the French and English elements in our early literature.
3. The Church of the fourteenth century, as represented by Chaucer and Langland.
4. The causes of the appearance of a great dramatic literature in the reign of Elizabeth.
5. The mediæval conception of the relations of man and woman.

[Choose one subject.]

Natural Science.

ZOOLOGY.

DR. MACALISTER.

1. Give the arguments in favour of any theory of the nature of the individuality of Sponges.
2. What are the characteristics of the *Flagellata*, and how are they divided?
3. Describe the varieties of the *contractile vesicle* in *Protozoa*.
4. What are the reproductive processes observed in *Noctiluca*?
5. Describe the organization of *Vorticella* or *Trichodina*.
6. Describe the development of the vertebral column.
7. What are the parts of the hyoid apparatus in the dog?
8. What constitutes the outer wall of the nasal cavity in the dog?
9. What are the boundaries of the cervical canal for the vertebral artery?
10. What elements enter into the first human sacral vertebra?

BOTANY.

DR. E. PERCEVAL WRIGHT.

1. What is meant by fasciation. Give an instance of its being inherited.
2. Give some examples of Synanthry.
3. In what form of Inflorescence is proliferation of the flower most frequently met with?

4. How would you explain the appearance known as Rose Willow?
5. State a common form of Heterogamy in the common Maize (*Zea Mays*).
6. Describe the different forms of Spike.
7. Describe free cell formation.
8. Give a sketch of the structure of the anther lobes of any plant.
9. Write out a classification of fruits.
10. Give a list of Plants from which Sugar is extracted for commerce.

SENIOR FRESHMEN.

Mathematics.

A.

MR. WILLIAMSON.

1. Calculate the area of the triangle, the co-ordinates of the middle points of whose sides are, respectively, $(2, -3)$, $(4, 7)$, $(-3, 2)$.
2. If a right line be such that the sum of the squares of the perpendiculars let fall on it from any number of fixed points is constant: prove that the line always touches a fixed circle.
3. Find the co-ordinates of the pole of the right line $3x - 4y = 7$, with respect to the circle $x^2 + y^2 - 4x + 6y = 10$.
4. If from a fixed point A , a variable line AP be drawn, meeting a fixed right line in P , and if AP be produced to Q until PQ is a constant length: find the equation of the locus of Q referred to rectangular axes of co-ordinates.
5. Find the equation of the circle which passes through the origin, and the points $(2, 4)$ $(-3, 5)$.
6. Find two numbers such that their sum, multiplied by the sum of their squares, shall be 405, and their difference multiplied by the difference of their squares shall be 81.

DR. TRAILL.

7. If $x'y'$, $x''y''$, $x'''y'''$ be the co-ordinates of the vertices of a triangle, find the equations of the bisectors of the sides, and from their equations prove that they intersect in a point.
8. Find the condition that the line $Ax + By + C = 0$ should touch the circle $(x - \alpha)^2 + (y - \beta)^2 = r^2$.

e

9. Find the equation of the circle, described on the line joining the points $x'y'$, $x''y''$, as diameter.

$$\begin{aligned} 10. \text{ If } H &= a_0 a_2 - a_1^2, \quad I = a_0 a_4 - 4a_1 a_3 + 3a_2^2, \\ G &= a_0^2 a_3 - 3a_0 a_1 a_2 + 2a_1^3, \\ J &= a_0 a_2 a_4 + 2a_1 a_2 a_3 - a_0 a_3^2 - a_4 a_1^2 - a_2^3, \end{aligned}$$

prove the following identical relation :

$$G^2 = a_0^2 HI - a_0^3 J - 4H^3.$$

$$\begin{aligned} 11. \text{ If } H_0 &= (\beta - \gamma)^2 + (\gamma - \alpha)^2 + (\alpha - \beta)^2, \\ H_1 &= \alpha(\beta - \gamma)^2 + \beta(\gamma - \alpha)^2 + \gamma(\alpha - \beta)^2, \\ H_2 &= \alpha^2(\beta - \gamma)^2 + \beta^2(\gamma - \alpha)^2 + \gamma^2(\alpha - \beta)^2, \end{aligned}$$

prove that

$$\frac{1}{(\alpha - \beta)^2} + \frac{1}{(\beta - \gamma)^2} + \frac{1}{(\gamma - \alpha)^2} = \frac{3}{4} \left(\frac{H_0^2}{H_0 H_2 - H_1^2} \right).$$

12. Prove that the radii of the circles escribed to a triangle are the roots of the following cubic equation in x :

$$(x^2 + s)(x - r) = 4Rx^2,$$

where R , r are the radii of the circumscribed and inscribed circles, and s the semiperimeter of the triangle.

MR. PANTON.

13. Prove that the three lines

$$\begin{aligned} Ax + By + C &= 0, \quad A'x + B'y + C' = 0, \\ (lA + mA')x + (lB + mB')y + lC + mC' &= 0, \end{aligned}$$

pass through the same point, and find the co-ordinates of this point.

14. Exhibit by means of a figure the position of the three points

$$(2, 3), (0, -1), (-1, 0),$$

and find the equation of the circle passing through them. Find also the length of the tangent to this circle from the point $(3, 4)$.

15. Find the equations of the two lines drawn parallel to the line

$$3x + 4y = 0,$$

to touch the circle $x^2 + y^2 - 2x - 4y + 1 = 0$.

16. Given the base c , the area m^2 , and the vertical angle C of a plane triangle; express in terms of these quantities the sides a and b .

17. If a , b , c are the sides of a plane triangle, and

$$\cos \theta = \frac{a}{b+c}, \quad \cos \phi = \frac{b}{c+a}, \quad \cos \psi = \frac{c}{a+b},$$

prove that

$$\tan^2 \frac{1}{2} \theta \cdot \tan^2 \frac{1}{2} \phi \cdot \tan^2 \frac{1}{2} \psi = \tan^2 \frac{1}{2} A \cdot \tan^2 \frac{1}{2} B \cdot \tan^2 \frac{1}{2} C.$$

18. Solve the equations

$$x^2 + y^2 + z^2 = 2a^2,$$

$$x + y + z = 2b,$$

$$yz = c^2.$$

B.

MR. WILLIAMSON.

1. If the equation of a curve in polar co-ordinates be

$$r^{\frac{1}{2}} = a^{\frac{1}{2}} \cos \frac{\theta}{2},$$

find its equation in rectangular co-ordinates.

2. Find the co-ordinates of the centre and the equation of the circle which cuts orthogonally the three circles

$$x^2 + y^2 + 3x + 14y + 1 = 0,$$

$$x^2 + y^2 - 7x + 2y + 2 = 0,$$

$$x^2 + y^2 - 5x - 6y + 3 = 0.$$

3. Prove that the determinant

$$\begin{vmatrix} 0, & c^2, & b^2, & d^2 \\ c^2, & 0, & a^2, & b^2 \\ b^2, & a^2, & 0, & c^2 \\ d^2, & b^2, & c^2, & 0 \end{vmatrix}$$

is equal to

$$(ad + be + cf)(ad + be - cf)(ad + cf - be)(cf + be - ad).$$

4. Expand $(1-x)^{\frac{1}{2}}$ by the Binomial Theorem, and give the coefficient of x^n .

5. Prove that all circles which touch externally two fixed circles cut at the same angle a third circle, coaxial with the given circles.

DR. TRAILL.

6. Describe geometrically a parabola touching four given right lines.

7. Find the locus of the centre of a circle passing through a given point, and touching a given straight line.

8. If α, β, γ , be the roots of a cubic equation, prove that it can be written in the following form:—

$$X^3 - \frac{\begin{vmatrix} 1 & \alpha & \alpha^2 \\ 1 & \beta & \beta^2 \\ 1 & \gamma & \gamma^2 \end{vmatrix}}{\begin{vmatrix} 1 & \alpha & \alpha^2 \\ 1 & \beta & \beta^2 \\ 1 & \gamma & \gamma^2 \end{vmatrix}} X^2 + \frac{\begin{vmatrix} 1 & \alpha^2 & \alpha^3 \\ 1 & \beta^2 & \beta^3 \\ 1 & \gamma^2 & \gamma^3 \end{vmatrix}}{\begin{vmatrix} 1 & \alpha & \alpha^2 \\ 1 & \beta & \beta^2 \\ 1 & \gamma & \gamma^2 \end{vmatrix}} X - \alpha\beta\gamma = 0$$

9. In a spherical triangle, if D be the distance between the centres of the inscribed and circumscribed circles, whose radii are r and R , prove that

$$\sin^2 D = \sin^2(R - r) - \cos^2 R \sin^2 r,$$

and show how to deduce from this the analogous formula for a plane triangle.

10. Find the value of the determinants,

$$\begin{vmatrix} 1, & 2, & 3, & 4, & 5, \\ 2, & 3, & 4, & 5, & 6, \\ 3, & 4, & 5, & 6, & 7, \\ 4, & 5, & 6, & 7, & 8, \\ 5, & 6, & 7, & 8, & 9, \end{vmatrix} \quad \text{and} \quad \begin{vmatrix} 1, & 3, & 5, & 7, & 9, \\ 3, & 5, & 7, & 9, & 11, \\ 5, & 7, & 9, & 11, & 13, \\ 7, & 9, & 11, & 13, & 15, \\ 9, & 11, & 13, & 15, & 17, \end{vmatrix}$$

MR. PANTON.

11. If $x = a \cos (\alpha + \theta)$, $y = b \cos (\beta + \theta)$, $z = c \cos (\gamma + \theta)$; prove that

$$\frac{x}{a} \sin (\beta - \gamma) + \frac{y}{b} \sin (\gamma - \alpha) + \frac{z}{c} \sin (\alpha - \beta) = 0.$$

12. If α, β, γ , are the roots of

$$x^3 + px^2 + qx + r = 0;$$

find the equation whose roots are

$$\frac{\alpha}{\beta + \gamma}, \quad \frac{\beta}{\gamma + \alpha}, \quad \frac{\gamma}{\alpha + \beta}.$$

13. Prove the following formulæ in a spherical triangle :—

$$\tan \frac{1}{2} (a + b) = \frac{\cos \frac{1}{2} (A - B)}{\cos \frac{1}{2} (A + B)} \tan \frac{1}{2} c,$$

$$\tan \frac{1}{2} (a - b) = \frac{\sin \frac{1}{2} (A - B)}{\sin \frac{1}{2} (A + B)} \tan \frac{1}{2} c.$$

14. Find the locus of the foot of the perpendicular from the origin on a chord of the circle

$$x^2 + y^2 + 2gx + 2fy + c = 0$$

which subtends a right angle at the origin.

15. Given two chords of a parabola perpendicular to the axis; find the focus.

C.

MR. WILLIAMSON.

1. If a chord of an ellipse subtend a constant angle at one of its foci, prove that its envelope, and the locus of its pole, are conics having the same focus and directrix.

2. From a point P perpendiculars are drawn to three given lines: find the locus of P when the area of the triangle formed by joining the feet of the perpendiculars is constant.

3. Find in a determinant form a relation connecting the lengths of the common tangents to any five circles.

4. Prove that the determinant

$$\begin{vmatrix} \sin \alpha, & \sin \beta, & \sin \gamma \\ \sin 2\alpha, & \sin 2\beta, & \sin 2\gamma \\ \sin 4\alpha, & \sin 4\beta, & \sin 4\gamma \end{vmatrix}$$

is divisible by the determinant

$$\begin{vmatrix} 1, & 1, & 1 \\ \cos \alpha, & \cos \beta, & \cos \gamma \\ \cos^2 \alpha, & \cos^2 \beta, & \cos^2 \gamma \end{vmatrix}$$

and find the quotient.

5. Given the base of a spherical triangle, and the sum of its sides, prove that the product of the sines of the perpendiculars drawn from the extremities of the base to the external bisector of the vertical angle is constant.

DR. TRAILL.

6. If X and Y be given by the simultaneous equations,

$$(x' - x'')X + (y' - y'')Y = (x' - x'')x''' + (y' - y'')y''',$$

$$(x'' - x''')X + (y'' - y''')Y = (x'' - x''')x' + (y'' - y''')y',$$

prove the following expressions for X and for Y :

$$\begin{vmatrix} x' & x'' & x''' \\ y' & y'' & y''' \\ 1 & 1 & 1 \end{vmatrix} X = \begin{vmatrix} y' & x''', & y'' & x', & y''' & x'' \\ 1 & 1 & 1 & 1 & 1 & 1 \end{vmatrix} + \begin{vmatrix} y' & y'' & y''' \\ y'^2 & y''^2 & y'''^2 \\ 1 & 1 & 1 \end{vmatrix}$$

$$\begin{vmatrix} x' & x'' & x''' \\ y' & y'' & y''' \\ 1 & 1 & 1 \end{vmatrix} Y = \begin{vmatrix} y'' & y''', & y''' & y', & y' & y'' \\ x' & x'' & x''' & x'' & x' & x'' \\ 1 & 1 & 1 & 1 & 1 & 1 \end{vmatrix} + \begin{vmatrix} x'^3 & x''^3 & x'''^3 \\ x' & x'' & x''' \\ 1 & 1 & 1 \end{vmatrix}$$

7. If two adjacent sides of a quadrilateral be taken for axes, and if the remaining sides be

$$\frac{x}{2a} + \frac{y}{2b}, \text{ and } \frac{x}{2a'} + \frac{y}{2b'} = 1,$$

find the co-ordinates of the three middle points of the diagonals, and verify the fact that these points lie on a right line.

8. If $a_0 x^4 + 4a_1 x^3 + 6a_2 x^2 + 4a_3 x + a_4 = 0$ be a biquadratic, and

$$A_0 y^3 + 3A_1 y^2 + 3A_2 y + A_3 = 0$$

its auxiliary cubic, prove that $H_1 = \frac{4}{3} I$, and $G_1 = 16 J$, or

$$(A_0 A_2 - A_1^2) = \frac{4}{3} (a_0 a_4 - 4a_1 a_3 - 3a_2^2), \text{ and}$$

$$(A_0^2 A_3 - 3A_0 A_1 A_2 + 2A_1^3) = 16 (a_0 a_2 a_4 + 2a_1 a_2 a_3 - a_0 a_3^2 - a_4 a_1^2 - a_2^3)$$

and also that

$$G_1^2 - 4H_1^3 = \frac{4^4}{27} (27J^2 - I^3).$$

9. If α, β, γ be the angles of a plane triangle, prove the following equation:

$$\begin{vmatrix} 1, & 1, & 1, \\ \cos \alpha, & \cos \beta, & \cos \gamma, \\ \cot \alpha, & \cot \beta, & \cot \gamma, \end{vmatrix} = \frac{\sin \frac{1}{2}(\alpha - \beta) \sin \frac{1}{2}(\beta - \gamma) \sin \frac{1}{2}(\gamma - \alpha)}{\sin \frac{1}{2} \alpha \cdot \sin \frac{1}{2} \beta \cdot \sin \frac{1}{2} \gamma}$$

10. In a plane triangle whose angles are A, B, C , prove that the tri-linear co-ordinates of the intersection of the perpendiculars are

$$\cos B \cdot \cos C, \quad \cos C \cdot \cos A, \quad \cos A \cdot \cos B,$$

those of the intersection of the bisectors of the sides

$$\sin B \cdot \sin C, \quad \sin C \cdot \sin A, \quad \sin A \cdot \sin B,$$

and those of the centre of the circumscribing circle

$$\cos A, \quad \cos B, \quad \cos C,$$

and prove that these three points lie on a right line by verifying the equation

$$\begin{vmatrix} \cos A, & \cos B, & \cos C, \\ \cos B \cdot \cos C, & \cos C \cdot \cos A, & \cos A \cdot \cos B, \\ \sin B \cdot \sin C, & \sin C \cdot \sin A, & \sin A \cdot \sin B, \end{vmatrix} = 0.$$

MR. PANTON.

11. Eliminate ϕ from the equations

$$\rho \cos(\theta - 3\phi) = 2a \cos^3 \phi,$$

$$\rho \sin(\theta - 3\phi) = 2a \sin^3 \phi.$$

12. If $\alpha, \beta, \gamma, \delta$ are the roots of the equation

$$x^4 + px^3 + qx^2 + rx + s = 0,$$

express in terms of the coefficients the determinant

$$\begin{vmatrix} 1 & \beta\gamma\delta & \beta\gamma\delta & \beta\gamma\delta \\ \gamma\delta\alpha & 1 & \gamma\delta\alpha & \gamma\delta\alpha \\ \delta\alpha\beta & \delta\alpha\beta & 1 & \delta\alpha\beta \\ \alpha\beta\gamma & \alpha\beta\gamma & \alpha\beta\gamma & 1 \end{vmatrix}$$

13. Form a reducing cubic of the equation $x^4 + qx^3 + rx + s = 0$, whose roots shall be λ, μ, ν , assuming

$$x = \sqrt{\mu\nu} + \sqrt{\nu\lambda} + \sqrt{\lambda\mu};$$

and show that if the biquadratic has a double root, the cubic will have the same double root,

14. If two of the three diagonals of a spherical quadrilateral be quadrants, prove that the third also is a quadrant.

15. The co-ordinates of the vertices of a triangle are

$$(\cos \alpha, \sin \alpha), \quad (\cos \beta, \sin \beta), \quad (\cos \gamma, \sin \gamma);$$

find (1) the co-ordinates of the feet of the perpendiculars let fall from the point $(\cos \lambda, \sin \lambda)$ on the sides of this triangle; and prove (2) that these three points lie on the same right line.

Classics.

PLATO.

MR. GRAY.

Translate the following passages :—

1. *Beginning*, Ἄν οὖν τύχῃ ὁ ἐρόμενος ἡμᾶς ὑβριστῆς ὦν, κ. τ. λ.
Ending, εἰάν δὲ τὰ ἡδία ὑπὸ τῶν ἀνιαρῶν, οὐ πρακτεῖα.
2. *Beginning*, ΚΑΛ. Οὐτοσὶ ἀνὴρ οὐ παύσεται φλυαρῶν, κ. τ. λ.
Ending, ΚΑΛ. Πάννυ γε.
3. *Beginning*, ΘΕΟ. Πῶς δὴ οὖν λέγεις; κ. τ. λ.
Ending, δεινοὶ τε καὶ σοφοὶ γεγονότες, ὥς οἴονται.

1. Give some particulars of the life of Plato.
2. Distinguish between Rhetoric and Dialectic. Give some account of those who first made a name in each department.
3. Give the substance of Grote's remarks on the Sophists.
4. How does he explain Plato's hostility against them? He names a distinguished Athenian, and a Roman, as fair examples of what they really were? How does he repel the assertions of those who denounce the Sophists as poisoners of Athenian morality, on the alleged authority of Plato?
5. "The influence of Socrates on the speculative mind of his age was marked and important, as to subject, as to method, and as to doctrine." Explain this statement at some length.
6. Compare Socrates in these points with previous philosophers.
7. Mention any remarkable statements or sentiments put into the mouth of Protagoras by Plato, which have struck you while studying the dialogue bearing that name.
8. The indications of time occurring in a dialogue cannot be depended on to fix precisely its dramatic date. Illustrate this in the case of the Gorgias.

CICERO.—EPISTLES.

MR. ABBOTT.

Translate the following passages :—

1. *Beginning*, Sed nescio, an ταυτόματον ἡμῶν,
Ending, sed certe aliquid sermonis fuit.

Ad Att., lib. i. ep. 12.

2. *Beginning*, Nunc reus erat apud Crasum Divitem Vettius de vi: ...
Ending, ea quam quotidie timere potueramus, subito exorta est.
 Lib. ii. ep. 24.
3. *Beginning*, Nihil *εὐκαιρότερον* epistola tua,
Ending, Puerum Ciceronem curabis et amabis, ut facis.
 Lib. iv. ep. 7.
4. *Beginning*, Nunc, ad rem ut redeam, *inhibere* illud tuum,
Ending, remigationis navem convertentis ad puppim.
 Lib. xiii. ep. 21.

1. Write short notes on the foregoing passages when required by an allusion or construction.
2. What was the true meaning of the title *Imperator*, according to Mommsen?
3. Describe the measures taken by Cæsar for the reorganization of the military system.
4. What important changes were made by him in the laws relating to debt and bankruptcy?
5. Give some account of the writings of Varro.
6. Explain the following expressions:—

Putealia sigillata.
 Nosti illas *ληκίθους*.
 ut *induceretur locatis* postulaverunt.
 dicis caussa.
 dignitatis *ἄλις* tanquam *δρνώς*.

MR. MAHAFFY.

Translate into Greek prose:—

Both parties are in error at the outset. They undertake to declare what the mind *is*, before they have determined what it *is known* as. The early physiologists gave out that the mind was some kind of *aura* or finer breath, some highly attenuated species of matter; but they certainly never succeeded in showing that it was known as this. That very important point was prejudged. Their hypothesis was founded upon analogy. Matter was patent to universal observation. All things were seen to be material. Man's organism was material,—why should not his mind, his most intimate self, follow the same analogy, and be material too? Hence its materiality was assumed. The word, indeed, by which the thinking principle is designated in all languages bears evidence to the inveteracy of the superstition that the conception of mind might be formed by conceiving a material substance of extreme fineness and tenuity.

Translate into Latin prose:—

What sad event is this of Alexio! It is incredible how much sorrow it has caused me, and, believe me, by no means chiefly for the

reason which people assign when they say to me, "whom will you get for a physician?" What have I now to do with a doctor? or, if I require one, is there such a dearth of them? What I regret is his affection for me—his kindness—his agreeable disposition. Besides, I cannot help thinking what cause there may not be for alarm when such a disease has so suddenly carried off a man so temperate in his habits, and a physician of such eminent skill. But in all this I console myself by reflecting that we are born to bear all accidents which can happen to mortal man.

Translate the following into Latin verse :—

"And now when thus with blended vows and prayers
 The people of the dead I had implor'd,
 The sheep I took, and in the trench let fall
 Their sever'd heads: and hereupon gush'd out
 The dark black blood. Then forth from Erebus
 Came thronging the faint shadows of the dead:
 Affianc'd girls and youths, and aged men
 Who in their day of life had much endur'd;
 And damsels delicate, on whose young mind
 Some recent grief had prey'd, and many a man
 In martial fame once eminent, by wounds
 From brass-tipp'd spear disabled, and in mail
 All blood-stain'd clad;—who in thick gathering crowds
 About the trench on all sides flitted by,
 With wailings many, and by earthly voice
 Unutt'able; till pale fear subdued me quite."

Translate the following into Greek verse :—

And Elijah came unto all the people, and said, How long halt ye between two opinions? If the Lord be God, follow him; but if Baal, then follow him. And the people answered him not a word.

Then said Elijah unto the people, I, even I only, remain a prophet of the Lord, but Baal's prophets are four hundred and fifty men.

Let them therefore give us two bullocks; and let them choose one bullock for themselves, and cut it in pieces, and lay it on wood, and put no fire under; and I will dress the other bullock, and lay it on wood, and put no fire under;

And call ye on the name of your gods, and I will call on the name of the Lord: and the God that answereth by fire, let him be God. And all the people answered and said, It is well spoken.

Logics.

DR. STUBBS.

1. Examine the following arguments, putting them into syllogistic form :—

(α). All the most bitter persecutions have been religious persecutions : among the most bitter persecutions were those which occurred in France during the Revolution : therefore they must have been religious persecutions.

(β). No evil should be allowed that good may come of it : all punishment is evil : therefore no punishment should be allowed that good may come of it.

(γ). All that glitters is not gold : tinsel glitters : therefore it is not gold.

2. According to Mill, what is the true place of the syllogistic form in reasoning ?

3. Give from Euclid examples of a disjunctive syllogism ; and of a syllogism disjunctive *ex enumeratione partium*.

4. Put the following reasoning into the form of a sorites :—

“To be of the species Man, and to have a right to the name Man, is the same thing ; to be of the species Man, and to have the essence of a Man, is the same thing ; now since nothing can be a Man, or have a right to the name Man, but what has a conformity to the abstract idea the name Man stands for ; nor anything to have a right to the species Man, but what has the essence of that species ; it follows that the abstract idea for which the name stands and the essence of the species is one and the same.”

DR. TABLETON.

1. If the conclusion be substituted for the major premiss in a received mode, and the new premisses be affirmative and legitimate, determine the mode and figure of the new and of the old syllogism.

2. If p Xs are Ms, and q Ys are Ms, and n the whole number of Ms in existence is less than $p + q$, show that at least $(p + q - n)$ Ys are Xs.

3. Apply Sir William Hamilton's principles to draw conclusions, if possible, from the following pairs of premisses :—

All M is some X,
No Y is some M.

No X is any M,
All Y is some M.

Some X is all M,
Some M is some Y.

Some M is not some X,
Some Y is some M.

4. In applying *Reductio ad impossibile* to a received syllogism, prove that if subcontrariety be introduced it will result.

Is it possible in any case to have a valid process of *Reductio ad impossibile* in which the introduced opposition is subcontrariety?

5. Show that in reference to the true import of propositions, it is more correct to consider analytical reasoning as based on the dictum than as resting on the syllogistic axioms.

6. Determine the syllogistic mode, not in the third figure, in which *Reductio ad impossibile* with introduced contradiction can lead to contrariety, and show that it may be reduced so as to have the resulting opposition contradiction.

7. If the opposite of the conclusion be substituted for either premiss in a legitimate syllogism, and the new premisses be legitimate, the new conclusion will be opposed to the suppressed premiss or to its converse.

8. Under what limitations must the statement be received that from two negative premisses nothing follows.

MILL'S LOGIC, BOOK I.

DR. SHAW.

1. Compare the different senses in which writers on Logic have interpreted that term.

2. Enumerate the Categories of Aristotle, and briefly comment on them, noticing Mill's criticisms and Bain's vindication.

3. Mill draws a distinction between the connotation of such pairs of words as sovereign and subject, physician and patient, &c., on the one hand, and such pairs as mortgagor and mortgagee, obligor and obligee, on the other. State the distinction, and discuss its validity.

4. By what process does Mill establish his ultimate classification of Nameable Things?

5. On what grounds does Mill conclude that the modality of a proposition ought to be regarded as part of the copula, not as part of the predicate.

6. "The prime minister must have dissolved parliament at once or his ministry would have been left in a minority at the next election."

"The revolution of the sun round the earth has been disbelieved since the time of Galileo."

According to Mill these two propositions may be identified in structure. Show this, and discuss the sufficiency of his explanation of the fact that logicians have treated them as generically distinct.

7. Establish the fundamental identity of Hobbes' theory of predication with that sanctioned by Whately, and which makes predication consist in referring an individual or a number of individuals to a class.

8. Mill justifies, by means of examples, the two statements—

1st. That every proposition expressed in abstract terms can be transformed into a precisely equivalent proposition in concrete terms; and

2nd. That every assertion respecting an attribute may be transformed into a precisely equivalent assertion respecting the fact or phenomenon which is the ground of the attribute.

Prove both propositions by examples of your own.

9 The import of every non-essential proposition may be conveniently expressed in one or the other of two formulas. One of these possesses great advantages over the other for the purposes of the Theory of Reasoning. Which of them? and why?

10. How does Mill distinguish between the attributes which do and those which do not serve as a basis for the Aristotelian species and genera.

JUNIOR FRESHMEN.

Mathematics.

A.

MR. WILLIAMSON.

1. If from three points A, B, C on a right line, perpendiculars AL, BM, CN be drawn to another right line, prove that

$$AB \times CN + BC \times AL + CA \times BM = 0;$$

taking account of the direction, as well as the magnitude, of the lines.

2. Find the centre of mean position of any number (n) of points, and show that the algebraic sum of the perpendiculars let fall from the n points to any right line is n times the perpendicular let fall from the centre of mean position.

3. If a quadrilateral be circumscribed to a circle, prove that the line joining the middle points of its diagonals passes through the centre of the circle.

4. The sides of a triangle are 50, 78, and 80, respectively; find the lengths of its three perpendiculars.

5. A circle rolls within another of double its radius; determine the locus described by any point on its circumference.

6. Describe a circle passing through a given point, and touching a given line and a given circle; and find the number of solutions of the problem.

DR. TRAILL.

7. Inscribe the rectangle of maximum area in a given segment of a circle.

8. Given the base, the sum or difference of the sides, and the locus of the vertex a right line; construct the triangle.

9. When the three perpendiculars from the vertices of one triangle on the sides of another meet in a point, then the three perpendiculars from the vertices of the latter on the sides of the former also meet in a point.

10. Show that the centre of the circumscribing circle of any triangle, the centre of the nine-point circle, the intersection of the perpendiculars, and the intersection of the bisectors of the sides, all lie upon the same right line.

11. The angle subtended at any point of a circle by a pair of inverse points, is bisected by the lines joining the point to the extremities of the diameter on which the inverse points are situated.

12. Given the base, and the ratios of the sides of a triangle; show that the extremities of the base are inverse points with regard to the circle which is the locus of the vertex, and show that if the ratio of the sides be constantly changed, a whole system of coaxal circles will be generated.

MR. PANTON.

13. Given of a triangle the vertical angle, and the bisectors of sides from the extremities of base; construct it.

14. Given the vertical angle of a triangle, and the sum of sides; find the locus of the centre of the circumscribing circle.

15. Construct an equilateral triangle whose sides shall pass through given points, and whose area shall be a maximum.

16. Inscribe in a given circle a pentagon whose perimeter shall be a maximum.

17. Describe a circle passing through two given points, and cutting a given circle at right angles.

18. Find the locus of a point whose polars with respect to three given circles pass through the same point.

B.

MR. WILLIAMSON.

1. A person has £13,000, which he divides into two parts, and placing each at interest, receives an equal income. If he placed the first at the rate of interest of the second, he would receive £360 income, and if he placed the second at the rate of the first, he would receive £490 income. What are the sums, and what the rates of interest?

2. Find the true value of

$$\frac{\sqrt{a+x} - \sqrt{2x}}{\sqrt{a+3x} - 2\sqrt{x}} \text{ when } x = a.$$

3. The perpendiculars of a triangle are 3, 4, and 6 respectively; calculate the lengths of its sides.

4. If all the sides of a quadrilateral inscribed in a circle be given, show how its area, diagonals, and the radius of circumscribing circle can be determined.

5. Solve the simultaneous equations

$$(x^2 + y^2)(x^3 + y^3) = 455, \text{ and } x + y = 5.$$

f

DR. TRAILL.

6. Find the value of

$$\lambda X^3 + \mu Y^3 + \nu Z^3,$$

$$\text{when } \lambda X^3 = \mu Y^3 = \nu Z^3,$$

$$\text{and } \frac{1}{X} + \frac{1}{Y} + \frac{1}{Z} = \frac{1}{D}.$$

7. A person has two casks *A* and *B* containing a certain quantity of wine in each. He wishes to divide the wine equally between the casks, so he pours out of *A* into *B* as much as *B* contained at first, then from *B* into *A* as much as was left in *A*, then from *A* into *B* as much as was left in *B*, and so on until he got exactly 64 gallons in each. How many gallons were in each cask at first, and how many times did he pour wine from one into the other?

8. If *r* be the radix of any scale of notation, the sum of the digits of any number divided by (*r* - 1) will leave the same remainder as the number itself divided by (*r* - 1).

9. Find *x* from the equation

$$\frac{1+x-\sqrt{2x+x^2}}{1+x+\sqrt{2x+x^2}} = a \cdot \frac{\sqrt{2+x}+\sqrt{x}}{\sqrt{2+x}-\sqrt{x}}.$$

10. If the sides of a plane triangle be 145, 201.5, and 87.25, find the radii of the circumscribing and inscribed circles, and also those of the escribed circles; also find the lengths of the perpendiculars of the triangle.

MR. PANTON.

11. Solve the equation

$$\frac{a+x}{\sqrt{a}+\sqrt{a+x}} + \frac{a-x}{\sqrt{a}+\sqrt{a-x}} = \sqrt{a}.$$

12. If $\frac{x}{a} = y + z$, $\frac{y}{b} = z + x$, $\frac{z}{c} = x + y$, prove that

$$\frac{a(1-bc)}{x^2} = \frac{b(1-ca)}{y^2} = \frac{c(1-ab)}{z^2},$$

and that

$$2abc + bc + ca + ab - 1 = 0.$$

13. Simplify the expression

$$\frac{1}{(a-b)(a-c)(x-a)} + \frac{1}{(b-c)(b-a)(x-b)} + \frac{1}{(c-a)(c-b)(x-c)}$$

14. The perimeter of a right-angled triangle is 60, and the radius of the inscribed circle is 5; find each of the sides.

15. The base of a triangle is 16, the sum of the other two sides is 20, and the bisector of the base from vertical angle is 9; find the sides.

C.

MR. WILLIAMSON.

1. Prove that the radical centre of the three escribed circles of a triangle is the centre of the circle inscribed in the triangle formed by joining the middle points of the sides of the original triangle.

2. A, B, C are given points on the circumference of a circle; find the envelope of a chord LM , when

$$a \cdot AL \cdot AM + b \cdot BL \cdot BM + c \cdot CL \cdot CM$$

is given; a, b, c being constant multipliers.

3. If each of the sides of a triangle of given species passes through a fixed point, find the locus of the centre of its circumscribing circle.

4. Describe a circle passing through a given point, and cutting each of three given circles at the same angle.

5. If all the angular points of a polygon slide on given lines, which pass through a common point, and if all the sides except one turn about fixed points, prove that the last side also passes through a fixed point.

DR. TRAILL.

6. Let O be the common point of intersection of the circles circumscribing the four triangles formed by any four lines; from O drop perpendiculars on the lines. Prove that the line which passes through the feet of these perpendiculars is parallel to the line which passes through the four points in which the perpendiculars of the four triangles intersect, and prove that the distance between these lines is equal to the distance of the former line from O .

7. In any right-angled triangle, prove directly that the circle described on the bisector of the hypotenuse as diameter touches the inscribed circle.

8. Let AB be the base of a triangle, and C its vertex; let EF be the diameter of the circumscribing circle perpendicular to AB ; let GH be the diameter of the nine-point circle perpendicular to AB , and let D be the middle point of AB . Prove that the triangles ECF and GDH are in perspective, and that the centre of perspective coincides with the point of intersection of the bisectors of the sides of the triangle.

9. If a circle intersect three given circles A, B, C at constant angles, prove that it cuts orthogonally three other circles D, E, F , coaxial with B and C , C and A , A and B , respectively; and prove that the circles D, E, F are themselves coaxial.

10. Prove that the reciprocal polar of any triangle will be a similar triangle, if the centre of the reciprocating circle be either the point of intersection of the perpendiculars of the triangle, or any point on its circumscribing circle.

11. Prove that the circles described on the three diagonals of a complete quadrilateral are coaxial, and that they are each cut orthogonally by the circle circumscribing the triangle formed by those diagonals.

MR. PANTON.

12. If the extremities of a variable chord of one fixed circle are conjugate points with respect to another fixed circle, find the locus of the middle point of the chord.

13. A triangle is given in magnitude and position, and a circle given in magnitude; find where the circle should be placed so that the area of the triangle polar with respect to it of the given triangle should be a minimum.

14. A variable polygon of any order is inscribed in a circle of a coaxial system, and all the sides but one touch fixed circles of the same system; prove that that one also touches a fixed circle of the system.

15. The polars of a variable point P with respect to two fixed circles intersect in Q ; find the locus of the middle point of the right line PQ .

16. X and Y are two given circles, and O one of their limiting points; a variable tangent is drawn to Y cutting X in the points A, B . Prove that the circle circumscribing the triangle OAB is enveloped in all its positions by a circle concentric with X .

LIMITED COURSE.

MR. WILLIAMSON.

1. In a rectangle $ABCD$, if CL be drawn perpendicular to the diagonal BD , meeting it in L , and LN be drawn perpendicular to AD ; prove that BL is a mean proportional between AD and AN .

2. A, B , and C are given rectilinear figures; show how to construct a figure similar to C , and having to it the same ratio that A has to B .

3. Show how the area of a triangle can be found, when its sides are known; and calculate the area of the triangle whose sides are 39, 41, and 50, respectively.

4. The sum of three numbers in continued proportion is 57, and the sum of their squares is 1197; find the numbers.

5. Solve the simultaneous equations

$$2x^2 + 3xy - y^2 = 2, \text{ and } 2x - y + 1 = 0.$$

6. Find the sum of the fractions

$$\frac{\sqrt{-5} + \sqrt{-3}}{\sqrt{-5} - \sqrt{-3}} \text{ and } \frac{\sqrt{-5} - \sqrt{-3}}{\sqrt{-5} + \sqrt{-3}}.$$

DR. TRAILL.

7. Prove that the circle which passes through the feet of the perpendiculars of a triangle, also passes through the middle points of the sides.

8. Through a point outside a circle, draw a secant, so that the intercepted chord shall be of a given length.

9. If D be the foot of the perpendicular, from the vertex A of a triangle on the base BC , and if O be the point of intersection of the perpendiculars of the triangle, prove that, $AD \cdot OD = BD \cdot CD$.

10. If squares be described on the three sides of any triangle ABC , DE , KH , GF , being the sides of the squares parallel respectively to BC , CA , AB , prove that the triangles GAH , FBD , ECK formed by joining the adjacent corners of the squares, are each equal to the original triangle ABC .

11. If A be the point of contact of two circles, and if any line through A meet the circles in B and C , and if a tangent be drawn at B to one circle, meeting the other circle in D , prove that $CD^2 = AC \cdot BC$.

12. If a quadrilateral be inscribed in a circle, shew that the product of the perpendiculars from any point on the circle on two opposite sides, is equal to the product of the perpendiculars on the two remaining sides.

MR. PANTON.

13. If the middle points of the sides of any quadrilateral be joined by right lines, prove that these lines form a parallelogram, and that the area of the parallelogram so formed is half that of the quadrilateral.

14. Prove that the sum of the squares of the two diagonals of any quadrilateral together with the square of twice the line joining their middle points is equal to the sum of the squares of the four sides.

15. Prove that the line joining the centres of two circles intersecting in A and B bisects the line AB at right angles, and that the tangents to the two circles from any point on AB produced are of equal length.

16. Reduce to its simplest form the fraction—

$$\frac{x^5 + 11x^3 - 54}{x^3 + 11x + 12}.$$

17. If $\frac{1}{a} + \frac{1}{b} + \frac{1}{c} = \frac{1}{a+b+c}$; prove that

$$\frac{1}{a^3} + \frac{1}{b^3} + \frac{1}{c^3} = \frac{1}{(a+b+c)^3}.$$

18. Find the value of

$$XY - (1 - X^2)^{\frac{1}{2}}(1 - Y^2)^{\frac{1}{2}}, \quad \text{when}$$

$$2X = a + \frac{1}{a}, \quad 2Y = b + \frac{1}{b}.$$

Classics.

MR. ABBOTT.

Translate the following passages :—

1. *Beginning*, Λογίζεσθε δὴ πρὸς θεῶν καὶ θεωρεῖτε, κ. τ. λ.
Ending, καθαρὸν τὸν τούτων τινὰ ἀποκτείναντα εἶναι.
DEMOSTHENES.
2. *Beginning*, Οὐκ ἔνεστι τούτων οὐδὲ ἔν χωρίς, κ. τ. λ.
Ending, ὧν οὐδὲν οὐδεὶς ἡδίκηται ἰδίᾳ δῆπου.
Ibid.
3. *Beginning*, Οἷς γάρ ἐστ' ἐν λόγοις ἡ πολιτεία, κ. τ. λ.
Ending, τῶν ἢ δι' ἀγνοίαν ἢ διὰ μοχθηρίαν ἀντιλεγόντων.
Ibid.
4. *Beginning*, Καὶ τὰ μηδέποτε γεγενημένα οὐ μόνον, κ. τ. λ.
Ending, ἐπειθεν ἑμοῦ τὰ ψευδῇ καταμαρτυρεῖν πρὸς ὑμᾶς.
ÆSCHINES.

1. Give some account of the Social War, 358–355.
2. What view is taken of the Theoric fund by Grote?
3. Describe the trierarchic reform introduced by Demosthenes.
4. What circumstances led to the Second Sacred War?
5. Explain the etymological origin of such double forms as εἶχον, ἔσχον. εἶπομην, ἔσκομην.
6. Explain the construction called the tertiary predicate.

CICERO.

MR. MAHAFFY.

Translate the following passages :—

1. *Beginning*, Neque enim si de rusticis rebus agricola.....
Ending, aliunde dicendi copiam petere non possit.
De Oratore, ii. 38.
2. *Beginning*, Brute, quid sedes? quid illam anum patri.....
Ending, turpissimum calumniae quaestum contulisti!
Ibid., ii. 55.
3. *Beginning*, Atque haec omnia verbo continentur.....
Ending, sed in verbis posita ducantur.
Ibid., ii. 64.
4. *Beginning*, Sunt etiam illa subabsurda,.....
Ending, "Aliquando, inquit tibi tuum negotium agere licebit."
De Oratore, ii. 67, 68.

5. *Beginning*, Unde enim simile duci potest

Ending, atque ut precario, non vi, veniasse videatur.

De Oratore, iii. 40, 41.

1. Give some account of the orator Antonius.
2. Write a note on the expression, *vir bonus*, in Cicero.
3. Give a sketch of the history of Greek eloquence, as far as possible in the words of Cicero.
4. Discuss the case of *Coponius v. Curius*.
5. Explain the jokes: *Fenum alios esse oportere.*
Nuculam an confixum vis facere?
Malui compilari quam venire.
6. Describe and criticise Lucullus' campaigns in Asia.
7. Discuss the *legal* peculiarities of the Gabinian Law.
8. What analogy to the Holy Roman Empire is there in Roman History? Develop the points of resemblance.
9. What is Mommsen's estimate of Sallust's extant work?

MR. POOLE.

Translate the following passage into Greek prose:—

I have little to recommend my opinions but long observation and much impartiality. They come from one who has been no tool of power, no flatterer of greatness; and who in his last acts does not wish to belie the tenor of his life. They come from one, almost the whole of whose public exertion has been a struggle for the liberty of others; from one in whose breast no anger durable or vehement has ever been kindled, but by what he considered as tyranny; and who snatches from his share in the endeavours which are used by good men to discredit oppression, the hours he has employed on your affairs; and who in so doing persuades himself he has not departed from his usual office: they come from one who desires honours, distinctions, and emoluments but little; and who expects them not at all; who has no contempt for fame, and no fear of obloquy; who shuns contention, though he will hazard an opinion: from one who wishes to preserve consistency, but who would preserve consistency by varying his means to secure the unity of his end.—BURKE.

Translate the following passage into Latin Prose:—

But in the prosecution of a favourite scheme, the best of men, satisfied with the rectitude of their intentions, are subject to forget the bounds of moderation; nor did Probus himself sufficiently consult the patience and disposition of his fierce legionaries. The dangers of the military profession seem only to be compensated by a life of pleasure and idleness; but if the duties of the soldier are incessantly aggravated by the labours of

the peasant, he will at last sink under the intolerable burden, or shake it off with indignation. The imprudence of Probus is said to have inflamed the discontent of his troops. More attentive to the interests of mankind than to those of the army, he expressed the vain hope, that, by the establishment of universal peace, he should soon abolish the necessity of a standing and mercenary force. The unguarded expression proved fatal to him. In one of the hottest days of summer, as he severely urged the unwholesome labour of draining the marshes of Sirmican, the soldiers, impatient of fatigue, on a sudden threw down their tools, grasped their arms, and broke out into a furious mutiny. The Emperor, conscious of his danger, took refuge in a lofty tower, constructed for the purpose of surveying the progress of the work. The tower was instantly forced, and a thousand swords were plunged at once into the bosom of the unfortunate Probus.—GIBBON.

[Translate one of the following passages as directed.]

To be translated into Greek Verse :—

Why I am here, he who hath been most wrong'd,
 He who among you hath been most insulted,
 Outraged and trodden on, until he doubt
 If he be worm or no, may answer for me,
 Asking of his own heart, what brought him here ?
 You know my recent story, all men know it,
 And judge of it far differently from those
 Who sate in judgment to heap scorn on scorn.
 But spare me the recital—it is here,
 Here at my heart the outrage—but my words,
 Already spent in unavailing plaints,
 Would only show my feebleness the more,
 And I come here to strengthen even the strong,
 And urge them on to deeds, and not to war
 With woman's weapons ; but I need not urge you,
 Our private wrongs have sprung from public vices,
 In this—I cannot call it commonwealth
 Nor kingdom, which hath neither prince nor people,
 But all the sins of the old Spartan state
 Without its virtues—temperance and valour.

BYRON.

To be translated into Latin Verse :—

Call it not vain : they do not err,
 Who say, that when the Poet dies,
 Mute Nature mourns her worshipper
 And celebrates his obsequies ;
 Who say, tall cliff, and cavern lone,
 For the departed bard make moan :
 That mountains weep in crystal rill,
 That flowers in tears of balm distil ;

Through his loved groves that breezes sigh,
And oaks, in deeper groan, reply ;
And rivers teach their rushing wave
To murmur dirges round his grave.
Not that, in sooth, o'er mortal urn
Those things inanimate can mourn ;
But that the stream, the wood, the gale,
Is vocal with the plaintive wail
Of those, who, else forgotten long,
Lived in the poet's faithful song,
And with the poet's parting breath,
Whose memory feels a second death.

SCOTT.

EXAMINATION FOR DEGREE OF BACHELOR IN MEDICINE.

INSTITUTES OF MEDICINE.

DR. MAPOTHER.

1. Mention the classes of foods, and the effects of an excess and of a deficiency of each.
 2. State the most probable causes and concomitants of the various enlargements of the thyroid gland, including that described by Graves.
 3. What are the pathological conditions which arise in apnoea?
 4. Describe the natural processes by which the bleeding from a divided artery is stayed.
 5. State the results of injuries of the right crus cerebri, right half of the medulla oblongata, and right half of the spinal cord in the dorsal region, respectively.
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PHYSIOLOGICAL ANATOMY.

DR. M'DOWEL.

1. Draw a tracing of a healthy artery. Explain the several parts it consists of by a reference to the action of the heart and arteries.
 2. Explain the phenomena that occur in the phenomena of "blushing." How may these be illustrated by experiment?
 3. How would you perform the operation of transfusion so as to be in accord with the progress of modern physiological research?
 4. Enumerate the branches given off by the pneumogastric nerve in the nerve, and give their distribution.
 5. The mode of origin of the lymphatic vessels; the anatomy of a lymphatic vessel; the functions performed by the lymphatic vessels?
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SURGERY.

DR. E. H. BENNETT.

1. Name the varieties of lupus, and state the characters that distinguish this disease from epithelioma.
2. Enumerate the forms of abscess of the breast, and state the errors of diagnosis likely to occur in reference to each form.
3. Describe the oblique fracture of the lower third of the shaft of the femur, and the complications that may arise in its treatment.

4. What are the forms of disease that commonly simulate vesical calculus? State their diagnosis.

5. What are the characters and usual seat of the erectile tumour of Dupuytren? What are the chief difficulties in its treatment?

MIDWIFERY.

PROFESSOR SINCLAIR.

1. What dangers may arise from precipitate labour?

2. What is the usual mode of progress of the foetal head in the right fronto-cotyloid position?—and state what occasionally gives rise to delay in right and left fronto-cotyloid positions.

3. Describe the onset of a well-marked case of puerperal peritonitis, and mention the treatment you would adopt under the circumstances.

4. The diagnosis, prognosis, and treatment of retroversion of the uterus at the end of the second month of gestation?

5. Labial thrombus during labour—its nature, cause, and treatment?

MEDICAL JURISPRUDENCE.

DR. TRAVERS.

1. In a case of suspected *Infanticide*, you have carefully examined the dead body, and especially the thoracic viscera of the new-born child, with the object of determining—

(a). Whether it had survived its birth?

(b). Whether respiration had been fully established?

(c). Whether any, and if so what, means had been used to interrupt respiration?

State what conditions of the lungs, other than the changed specific gravity, would enable you to decide affirmatively on these points, or on some one or more of them.

2. What would be your treatment of an adult suffering from the action of a *poison* whose latent period is brief, and the dose adequate to destroy life is small? As examples, you will restrict your answers to

(a). Strychnia, or its salts.

(b). Hydrocyanic acid; cyanide of potassium; oil of bitter almonds.

3. Caius, assailed by Titius, has received a violent blow of a heavy stick, or other blunt weapon, inflicting a contused scalp wound, not regarded at first as a fatal injury, or as one endangering life; but subsequently, after three weeks had passed, symptoms of a deep-seated inflammation appear; rigors, convulsions, delirium, coma, with unyielding obstinacy to treatment. After death, besides the lesions directly traceable to the local injury, which included an undiscovered fracture of the subjacent parietal bone, you also find cardiac disease capable of destroying

life. The heart is loaded with fat, and, in addition to its interstitial deposit, there is adipose degeneration of its muscular fibres. Whether, then, will you refer the death to the injury of the head, or to the heart disease? State the reasons which induce you to prefer either alternative.

4. What appearances discoverable in the recent dead body of Tullia, who was in apparently vigorous health till three days previous, will lead you to conclude that shortly before her death she had aborted, and that *abortion had been criminally induced*?

5. Mention briefly the various physical conditions, either temporary or permanent, with which *unsoundness of mind* is likely to be associated as a consequence.

EXAMINATION FOR DEGREE OF MASTER IN SURGERY.

DR. ADAMS.

1. In a case of chronic enlargement of the prostate gland, attended with urgent symptoms of retention of urine, state what difficulties you may have to encounter in its treatment, the measures to be adopted on the first moment of the attack, and those to be had recourse to if your first efforts to give relief have failed.

2. What is to be observed in the anatomical characters of chronic rheumatic arthritis of the shoulder joint, which may well have suggested to not a few surgeons the errors they have fallen into of having attributed to accidental violence lesions the result of chronic rheumatic arthritis?

3. Give a description of strumous articular caries of the shoulder joint (frequently seen in young subjects) analogous to the scrofulous hip affection. State the early symptoms, and prognosis to be formed.

4. Describe a case of dislocation of the head of the humerus on the dorsum of the scapula, the result of accident; and mention whether any displacement of the head of the humerus in this same direction has been described by any anatomist as the result of any other cause.

5. Describe a case of benign fungus of the testicle; the history of the disease; the prognosis and treatment; and mention the names of authors who since the year 1808 have adverted to the symptoms and surgical treatment of this common affection.

DR. BUTCHER.

1. Mention the different forms of syphilitic testicle met with in practice; describe them, and the diagnostic marks between each, and other affections of the organ.

2. Describe the different directions in which the astragalus may be dislocated, and its relative anatomy in each position; also the treatment

most suitable in each case, together with the complications that may arise, and their management.

3. Describe minutely a *bad case* of paronychia affecting the thumb, the condition of the hand, &c.; its mode of treatment; and contrast this case with an equally bad one, where the middle finger is affected, and the treatment applicable.

4. Describe minutely the lesions in the fracture termed "Potts' Fracture;" the method of reduction, and the different modes of treatment.

5. Mention accurately the symptoms and appearances of the eye in a bad case of acute syphilitic iritis; trace the case from its commencement until the disease seriously threatens the loss of vision.

SURGICAL ANATOMY.

DR. M'DOWEL.

1. Describe the osseous connexions of the astragalus.

2. Contrast the right and left carotid arteries as to the relations in their first stages in the neck.

3. Describe the course of one of the nerves of the ninth pair. What branches does it give off in the neck, and what is their distribution?

4. Describe the "tunica vaginalis oculi;" give its attachments, and the uses which have been assigned to this structure.

5. Give a description of the wrist joint, and of its ligaments.

SURGERY.

DR. E. H. BENNETT.

1. What is the most common variety of fracture of the base of the skull? State its symptoms and modes of termination.

2. Explain the occurrence of retention of urine in a case of acute gonorrhœa in the male, uncomplicated by previous stricture; and write the details of treatment in full.

3. What are the varieties of displacement of the acromial extremity of the clavicle? State the symptoms, diagnosis, and prognosis of the common variety.

4. What is the method of amputation known as Teale's? State the advantages assigned by the author to the operation, and describe its details as applied to a case in which it is necessary to divide the femur at the junction of the upper and middle third of the shaft.

5. Give the characters of scirrhus carcinoma of the breast; and describe the progress of a case to its termination, where no operation has been performed.

MR. WILSON.

1. Describe the dental formation which is, according to Mr. Hutchinson, pathognomonic of inherited syphilis; and state what are the ocular complications usually found associated with that formation.

2. Describe the characteristic symptoms of serous iritis, and mention any other names it is known by. What should be the treatment?

3. Suppose a person, who states his sight is good, complains that after reading or writing for half an hour or so the words or letters appear to become confused, and run into one another, and that the effort to read causes pain and redness of eyes, especially at night; but that after a few minutes' rest reading can be resumed, to be again followed by the same symptoms: what would be the diagnosis, and the mode of establishing the diagnosis, and what should be the treatment?

4. What are the circumstances which should guide us in the treatment of gunshot wounds of the eye, and what should that treatment consist in as a rule?

5. Describe Liebreich's Bandage, and mention the cases in which it, as well as bandages in general, are most applicable in ophthalmic practice.

MAC CULLAGH PRIZE EXAMINATION,

THEORY OF ATTRACTIONS.

MR. TOWNSEND.

1. Prove geometrically Newton's theorem, that the attraction, for the law of the inverse square of the distance, of a thin stratum of matter spread uniformly over a spherical surface, is the same at every external point as if the mass of the stratum were concentrated at the centre of the sphere.

2. Determine geometrically, for the same law of force, the law of distribution of the matter in a thin stratum spread over a spherical surface, so that the attraction shall be the same at every external point as if the mass of the stratum were concentrated at any given point internal to the sphere.

3. Investigate generally the laws of force for which (a) the potential, (b) the attraction, of a thin stratum of matter, spread uniformly over a spherical surface, shall be the same as if the mass of the stratum were concentrated at the centre of the sphere.

4. The potential of a material stratum of any thickness, spread over a closed surface of any form, being supposed constant throughout the entire interior of the surface; show, by any method, that the law of attraction could only be that of the inverse square of the distance.

5. Calculate approximately, for the law of the inverse n^{th} power of the distance, the potential of a mass of any form at a very remote point; in terms of the three principal moments of inertia of the mass, and of the distance and direction angles of the point.

6. Represent in the same case geometrically, by means of the central ellipsoid of inertia of the mass, the three components of the moment of the reaction of an attracted particle at the point to turn the mass round its centre of gravity.

7. In the attraction of the ellipsoid for the law of the inverse square of the distance, if X, Y, Z be the three components at any internal point xyz ; (a) show geometrically that $X = Ax, Y = By, Z = Cz$; (b) give MacCullagh's geometrical investigation of the ordinary values of the three coefficients A, B, C .

8. In the same case, if for an external point xyz the three coefficients be respectively $X = A'x, Y = B'y, Z = C'z$, give MacCullagh's geometrical representation of B' and C' by means of the real focal conics of the ellipsoid, and show how to determine A' from them.

9. Calculate the attractions of a thin uniform circular plate at an external point in its plane, directly for the law of the inverse cube, and thence by Mr. Jellett's theorem for those of the inverse fifth and seventh powers of the distance.

10. Prove Dr. Sylvester's theorem, that a material particle, projected with the velocity from infinity in the plane of a thin uniform circular plate attracting it according to the law of the inverse fifth power of the distance, will describe freely the circle passing through the point in the direction of projection which intersects at right angles the circumference of the plate.

THE FIGURE OF THE EARTH.

LAPLACE.

DR. TRAILL.

1. If a homogeneous spheroid be bounded by an ellipsoidal surface, and if the law of attraction be that of nature, prove the following values for the forces of attraction (on an internal point) A, B, C , in the directions of the principal axes:—

$$A = \frac{3M \cdot \alpha}{a^3} \cdot F; \quad B = \frac{3M \cdot \beta}{a^3} \cdot \frac{d(\lambda F)}{d\lambda}; \quad C = \frac{3M \cdot \gamma}{a^3} \cdot \frac{d(\lambda' F)}{d\lambda'};$$

where

$$F = \int_{-1}^1 \frac{u^2 du}{(1 + \lambda^2 u^2)^{\frac{1}{2}} \cdot (1 + \lambda'^2 u^2)^{\frac{1}{2}}};$$

$$\lambda^2 = \frac{b^2 - a^2}{a^2}; \quad \lambda'^2 = \frac{c^2 - a^2}{a^2};$$

α, β, γ are the co-ordinates of the attracted point, a, b, c the semiaxes of the ellipsoid, and M its mass.

2. If V be the potential, and if $v = \frac{V}{M}$, prove that $\frac{dv}{da} = 0$; apply this theorem to show that we can reduce the calculation of the attraction of a spheroid on an external point to that on a point on its surface, and find expressions analogous to the above for A, B, C , when α, β, γ , is an external point.

3. Prove that the most general rational and integral function of $\sin \theta$, $\cos \theta$, $\sin \phi$, $\cos \phi$ which will satisfy Laplace's equation,

$$\frac{d}{d\mu} \left[(1 - \mu^2) \frac{du}{d\mu} \right] + \frac{1}{1 - \mu^2} \cdot \frac{d^2 u}{d\phi^2} + n(n+1)u = 0, \quad [\mu = \cos \theta],$$

$$\text{is } u = a_0 Q_n + (\alpha_1 \cos \phi + \beta_1 \sin \phi) \sin \theta \cdot \frac{dQ_n}{d\mu} \\ + (\alpha_2 \cos 2\phi + \beta_2 \sin 2\phi) \sin^2 \theta \cdot \frac{d^2 Q_n}{d\mu^2} + \&c. \dots + \&c. \dots$$

4. For the attraction of a spheroid differing but little from a sphere (radius = a), on a point on its surface where the sphere and spheroid are supposed to touch, if the law of gravity were that of the direct n^{th} power of the distance, prove the following expression for the attraction in a direction normal to the surface:—

$$(1) \quad \frac{dV}{dr} = \frac{dA}{dr} + \frac{n+1}{2a} (V - A),$$

$$A = \frac{2^{n+4} \cdot \pi \cdot a^{n+4}}{(n+3)(n+5)}.$$

(a). For the law of attraction in nature ($n = -2$), show that the above equation (1) is true for points not necessarily on a perpendicular to the surface, provided r pass very near the centre of gravity of the spheroid.

(b). From what considerations have Lagrange and Ivory shown that the equation (1) is only true for values of n between the limits $n = +\infty$ and $n = -2$, and that for negative values of n greater than 2, such an equation would be incorrect?

5. If V_1 be the potential of a solid spheroid, differing but little from a sphere, at any external point O , whose distance from the centre of gravity of the spheroid is r ; and if V_2 be the potential of the couche contained between the surface of the spheroid, and the sphere of equal volume, whose radius is a , at the point O' the foot of the perpendicular from O on its polar plane with regard to the sphere, prove the following theorem:

$$rV_1 - aV_2 = \text{volume of spheroid.}$$

6. If a point inside a couche, the exterior and interior surfaces of which are spheroids, be attracted equally on all sides (i. e. so that the accelerating force in any direction is = 0), find the relation between the radii vectores of the two bounding surfaces.

(a). If the interior surface be an ellipsoid, prove that the two surfaces will have the same centre of gravity and principal axes.

7. Show that if the value of V for a spheroid be given in either of the two following cases, its value at any attracted point can be found :—

I. When the attracted point is upon the polar axis produced.

II. When the attracted point is situated in the plane of the equator.

(a). In the case of an ellipsoidal spheroid, show that the expressions for V become integrable in each of the above cases.

8. Investigate the figure of equilibrium of a homogeneous fluid mass of density ρ , rotating with a velocity ω .

(a). Show that if the figure be an ellipsoid of revolution, its ellipticity is determined by the equation

$$(a) \quad \tan^{-1}\lambda = \frac{3\lambda + 2\epsilon\lambda^3}{3 + \lambda^2}, \text{ where } \epsilon = \frac{\omega^2}{4\pi\rho}.$$

(b). Show from an examination of the conditions necessary that the equation

$$y = \frac{3\lambda + 2\epsilon\lambda^3}{3 + \lambda^2} - \tan^{-1}\lambda$$

should have real roots, that the problem admits of two solutions for a given velocity of rotation, if λ be greater than the value which makes

$$(b) \quad \tan^{-1}\lambda - \frac{(7\lambda^2 + 9)\lambda}{(1 + \lambda^2)(9 + \lambda^2)} = 0.$$

(c). Show that ϵ can be considered under the form

$$(c) \quad \epsilon = \int_0^1 \frac{\lambda^2 u^2 (1 - u^2) du}{(1 + \lambda^2 u^2)^2};$$

and from this equation show how to arrive at the result given in (b) by finding the condition that ϵ , considered as a function of λ^2 , should be a maximum.

(d). Assuming the limiting value of λ given by equation (b) to be 2.5293, and the corresponding value of ϵ to be .1123, and the actual value of ϵ for the Earth to be .00114985, prove the two following statements of Laplace, viz. :—

(I.) “Every homogeneous fluid mass, whose density is equal to the mean density of the Earth, cannot be in equilibrium in an elliptic figure, if its time of rotation be less than .1009 days.”

(II.) “If the density of the Earth, supposed fluid and homogeneous, were 98 times less than its actual density, the figure which it should take to satisfy its actual motion would be the limit of all the elliptic figures with which equilibrium could subsist.”

(e). If the time of rotation were diminished gradually, show that the elliptic form of the fluid would disappear before that velocity of rotation would be reached which would make the particles fly off.

(f). Show that equilibrium could not exist if the figure of the Earth were an ellipsoid elongated towards the poles, the polar axis being still the axis of revolution.

9. Show that, though two figures of equilibrium of a fluid mass are generally possible, for a given velocity of rotation, these two figures must correspond to two different primitive impulses, or to such as are differently applied.

10. Show that if, instead of considering ω as constant, we examine the case of a fluid mass, acted on by primitive impulses, and then left to itself, and the mutual attractions of its own particles, it can only be in equilibrium under one elliptic figure.

11. Show that the sphere is not the only figure of equilibrium of a fluid homogeneous mass at rest, acted on only by the mutual attractions of its own particles.

12. How has Jacobi shown that an ellipsoid with three unequal axes is a possible figure of equilibrium of a rotating homogeneous fluid mass?

(a). Show that when this figure is possible, the axis of rotation must be the least axis of the ellipsoid.

(b). Show that the number of these possible ellipsoids is infinite, that one limit of these figures is a spheroid of revolution, and the other a cylinder of revolution.

(c). Show that this limiting spheroid is not a possible figure of the Earth.

(d). Show that the figure of the Earth cannot be an ellipsoid with three unequal axes.

EXAMINATION FOR THE BERKELEY MEDALS.

"THE FRAGMENTS OF THE GREEK COMIC POETS, AS EDITED BY MEINEKE."

DR. INGRAM.

Translate the following passages :—

- Beginning*, Ξένου τὸ δειπνὸν ἐστὶν ὑποδοχῆς. B. τίνος; κ. τ. λ.
Ending, κἀνδραυλον, ὑποβινητιῶντα βρώματα. Menander.
- Beginning*, Οὐδεὶς μ' ἀρίσκει περιπατῶν ἔξω θεός, κ. τ. λ.
Ending, οἱκοὶ μένειν σώζοντα τοὺς ἰδρυμένους. Ibid.
- Beginning*, Πόσοι τὸ πλῆθος εἰσὶν οἱ κεκλημένοι κ. τ. λ.
Ending, πάντες βλιχανώδεις εἰσὶ καὶ μεστοὶ λάπης. Diphilus.
- Beginning*, Παρατίθημ' ὀλοσχερῇ, κ. τ. λ.
Ending, Δούρειον ἐπάγω χῆνα τῷ φυσήματι. Ibid.
- Beginning*, ξεναγὸς οὗτος, ὅστις ἀν θώρακ' ἔχῃ, κ. τ. λ.
Ending, τοῦτ' ἐστὶν, ἀν εὐ προσδράμῃς πρὸς τὸ στόμα. Posidippus.

1. Write notes on the words ἀγγαρεύω, ἀκροθωραξ, ἀρρηφόρος, ἰνδε, λείχεια, ἴσσα, Καρίνη, οἰκόσιτος, ὑπόξυλος.

2. In what rare, or otherwise noteworthy, senses are the following words used in the Comic Fragments: ἀγαπητῶς, ἀναστομέω, αὐλή, ἱελαλλάσσω, μαλακός, φιμός?

3. ἀλογίστου τρόπου
ἀτύχημα φεύγειν ἐστὶν οὐκ αὐθαίρετον.

Grotius renders this: "infortunia inopina fugere non est in nostra manu." Is he right?

4. Explain the following:—

(a). πῶς ἂν βάλοιμ' Εὐριπίδην; B. οὐκ ἂν ποτε
Εὐριπίδης γυναικα σώσειεν.

(b). ἐν ἡμέραισιν αὐτὸν ἐπτά σοι, γέρον,
θέλω παρασχεῖν ἢ κολοκύντην ἢ κρίνον.

(c). νόμος φυλαχθεὶς οὐδὲν ἐστὶν ἢ νόμος,
ὁ μὴ φυλαχθεὶς καὶ νόμος καὶ δήμιος.

(d). ἔλκει δὲ γραμματεῖδιον
ἐκεῖσε δίθυρον καὶ παράστασις, μία
δραχμή.

(e). κληθεὶς ποτε
εἰς ἐστίασιν δωδεκάποδος ὄρθριος . . .

5. τῆς ἥτοι πόδες εἰσὶ δυνάδεκα πάντες ἄωροι.

Hom. Od. xii. 89.

How has this ἄωροι been explained from a fragment of Philemon?

6. παχὺς γὰρ ὅς ἔκειτ' ἐπὶ στόμα.

Of what other phrase does this remind us? Of whom is Menander speaking when it occurs?

7. ὀλκὴν ταλάντου χρυσίου σοι, παιδίον,
ἔστηκα τηρῶν.
μακάριος ἐκείνος δεκατάλαντον καταφαγών.

What inference does Pollux draw from these words?

8. What was the plot of the Φάσμα?

9. What names did the persons called by Terence Phaedria and Thais bear in the 'Eunuch' of Menander? The Gnatho and Thraso of Terence are taken from a different play of the same writer?

10. To what lost plays did the following passages respectively belong?—

(a). οὐ λυποῦντα δεῖ
παιδάριον ὀρθοῦν, ἀλλὰ καὶ πειθοντά τι.

(b). πρὸς ἅπαντα δειλὸν ὁ πίνης ἐστὶ γὰρ,
καὶ πάντας αὐτοῦ καταφρονεῖν ὑπολαμβάνει.

(c). ζῶμεν γὰρ οὐχ ὥς θέλομεν, ἀλλ' ὥς δυνάμεθα.

(d). ἐγὼ δ' ἀκροΐκος, ἐργάτης, σκυθρὸς, πικρὸς,
φειδωλός.

- (e). καὶ θεραπαινὶς ἦν μία·
αὕτη συνύφαινε ῥυπαρῶς διακειμένη.
(f). οὗτός ἐστι γαλιώτης γέρων.
(g). ὀλίγαις ἱραστῆς γίγον' ἑταίραις, ὦ Σύρα,
βέβαιος.
(h). ἐγὼ γὰρ εἰμι τῶν ἐμῶν ἐμὸς μόνος.

11. φθείρουσιν ἥθη χρήσθ' ὁμιλίας κακαί.

Where does this celebrated line seem to have occurred?

12. "Whom the gods love, die young." Where do we find this in Greek, and where in Latin?

13. Mention any imitations of Euripides which you have noticed in the remains of Menander.

14. What is the nature of the several works of Athenaeus, Harpocration, Photius, Pollux, and Stobaeus, in which many of the Comic Fragments have been preserved?

15. Quote any passages you recollect in the Latin poets, relating to Menander's personal appearance and manner, the character of his genius, the subjects of his comedies, and their fortunes on the Attic stage.

16. Give a short account of the critical treatment of the Fragments of Menander before Meineke.

MR. TYRRELL.

1. Give a scheme of the so-called *metrum Susarionium*, of the *metrum Eupolideum*, and of the varieties of the Pherecratean measure.

2. Write notes critical, illustrative, or explanatory, on the following:—

- α'. ἐπὶ τῷ ταρίχει τῷδε τοίνυν κόπτετον.
β'. καὶ ταῦτα μὲν μοι τῶν κακῶν παροψίδεις.
γ'. Εὖτε κισσοχαῖτ' ἀναξ, χαῖρε.
δ'. ἐνθα Διὸς μεγάλου θᾶκος πεσσοί τε καλοῦνται.
ε'. Ἑρασμονίδη Βάθιππε τῶν ἀωρολείων.
ζ'. πρῶτον ἀποπυρίαν ἔχω
ζυμίταν μὰ Δί' οὐ πλὴον γναφάλλων.

3. The Fragments of the Old Comedy supply us with the probable source of the latter part of the *Ranae* in which Aeschylus and Euripides are made to contend for the tragic throne.

4. Translate and explain fully:—

- α'. Πανδιονίδα πόλεως βασιλεῦ
τῆς ἐριβώλακος, οἷσθ' ἦν λέγομεν,
καὶ κύνα καὶ πόλιν ἦν παίζουσιν.
β'. ὡς ἔφν τῇ μητρὶ παίδων πρῶτος ἐκ βαλαντίου.

γ'. συγγενέσθαι διὰ χρόνου μ' ἑλιπάρει
δρυπεπίσι μάζαις καὶ διασκανδίκισαι.

5. τέκτονες εὐπαλάμων ὕμνων.

A Schol. on Ar. Eq. where these lines are quoted says: τοῦτο δὲ ἐκ τῶν Εὐμενίδων Κρατίνου. Correct this *Scholium*.

Tzetztes ascribes the words to Pindar; what passage of Pindar had he in his mind?

Cratinus introduces Δεξώ and Δωρώ as goddesses; how would you Latinise these names?

6. ὁ σχινοκέφαλος Ζεὺς ὁδὶ προσέρχεται
ὁ Περικλῆς, τῷ δέϊον ἐπὶ τοῦ κρανίου
ἔχων, ἐπειδὴ τοῦστρακον παροίχεται.

Explain fully the spaced words. What other epithets of Pericles do we find in the Comic Fragments?

7. ἀγερσικύβηλις. The comparison of another word found in the Fragments of Cratinus seems to throw doubt on the Scholiast's etymology for this word.

8. Cite parallel expressions from Cratinus for

- α'. λόγους ἀνασπᾶν (Soph.).
- β'. μὴδ' ἐξομόρξει μωρίαν (Eur.).
- γ'. αὐτεκμαγμα σόν (your express image) (Arist.).
- δ'. every beardless vain comparative (Shakspeare).
- ε'. plenus sacculus est araneorum (Catullus).

9. ἀμφιανακτίζειν. Explain, and adduce a similarly formed word. κακόδουλος. "Cratinum," says Meineke, "hoc nomen pro κακός δοῦλος posuisse non credibile est." Show by an analogously formed word that Meineke is wrong.

What is the difference between ἀμοργίς and ἄμοργις? What is ἀρμογή?

10. Et ludit rota nequiore talo.

This line in Martial has been corrected by the aid of an expression in Cratinus.

What word does Cratinus use in the same sense as the Latin *pergracari* = "to be dissolute."

11. Quote as many as you can of the *voces propriae* of the game of κάρταβος to be found in the Fragments of the Old Comedy.

12. Explain:—

- α'. χαῖρε χρυσόκερω βαβάκτα κήλων
Πάν,
- β'. εὐπρόσωπος ἦσθ' ὀνόματος οὐδὲν ἐπὶ χεῖρας φέρων
- γ'. ἰφεινδα παίζειν
- δ'. αἰγείρου θία.
- ε'. λαυροστάται.
- ζ'. συοβοιωιοί, κρουπεζοφόρον γένος ἀνδρῶν.

13. An expression used by Cratinus seems hard to reconcile with Aristophanes' apparently low estimate of the literary position of Euripides?

14. What information about the medical art has been preserved in the Fragments of Crates?

ἀλλὰ σικύαν ποτιβάλλω σοι καὶ τὸ λῆς ἀποσχάσω.

Why is this in the Doric dialect?

Which of the writers of Old Comedy seem to you most to resemble Euripides in style?

15. In the Old Comedy what parallel expressions are found to the following:—

"To turn up the little finger" (said of intemperate persons).

"To live as the bears do, by sucking their paws."

"To fit like a glove."

"Tute hoc intristi; tibi omne est exedendum."

"To flow away like water off a duck's back."

16. Give an instance of real humour (if there be in your opinion any) in the fragments of the Old Comedy.

17. Explain:—

α'. ταχὺ τῶν ἐρίων καὶ τῶν ἀνθρώπων τῶν παντοδαπῶν κατὰγωμεν

β'. συμπτύκτοις ἀνακαιοτοῖς.

γ'. μολγὸν αἶνειν.

δ'. ἀμφιφῶντα.

18. What curious sense do γέρων and γραῦς respectively bear in the Old Comedy?

What are the various meanings of τηλία?

19. Translate—

ζωμοῦ δ' ἔρρει παρὰ τὰς κλῖνας ποταμὸς κρέα θερμὰ κυλίνδων,
ὑποτριμματίων δ' ὄχειτοὶ τούτων τοῖς βουλομένοισι παρήσαν,
ὥστ' ἀφθονία τὴν ἐνθεσιν ἦν ἄρδονθ' ἀπαλὴν καταπίνειν.
λεκανίσκαισιν δ' ἀνάπαιστα παρῆν ἡδυσματίοις κατὰπαστα.
ὁπταὶ δὲ κίχλαι μετ' ἀμητίσκων εἰς τὸν φάρυγ' εἰσεπέτοντο·
τῶν δὲ πλακούντων ὥστιζομένων περὶ τὴν γνάθον ἦν ἀλαλητός.
μήτρας δὲ τόμοις καὶ χναυματίοις οἱ παῖδες ἀν' ἡστραγάλιζον.
οἱ δ' ἀνθρώποι πίονες ἦσαν τότε καὶ μέγα χρῆμα Γιγάντων.

20. What is the meaning of διάζεσθαι, used by Nicophron? Her-
mippus has a synonyme for this word. What is the parallel Latin
phrase?

βρύκεις κοπίδας. What is the similar expression in Timocles?

21. What wines were considered best, and what worst, by the Athe-
nians, in the days of the Old Comedy?

22. Give a list of forms of words peculiar to the Old Attic.

23. What is the allusion of Eupolis to Aristophanes?

24. α'. Woman's faith and woman's trust
Write the characters in dust,
β'. Persuasion sat upon his lips.
Where is the original source of the above?

25. α'. βληχῆτά τίκνα. This expression may be illustrated by another in the Old Comedy?

β'. καὶ τῷ Πυριλάμπους ἄρα Δήμῳ κυψέλη
[ἔνεστιν];

What is Meineke's restoration for ἔνεστιν?

- γ'. εἰς ὤμιλλαν ἀριστήσομεν,
ἢ κόψομεν τὴν μάζαν ὥσπερ ὄρυγα.
δ'. ἐγὼ δὲ νῦν δὴ τερετιῶ τι πτιστικόν,
ε'. ὑπέρου περιτροπή,
ζ'. πίνοντίς εἰσι πόρρω.

What similar expression to this is found in Aristophanes?

η'. αἰμασιολογεῖν ἀριστ' ἡπίστατο.

A passage in Hom. Od. xxiv. may guide to an inference as to the subject of the play of Theopompus in which these words are found,

26. Translate the following fragment from Epilycus:—

Ποττὰν κοπίδ', οἶῶ, σῶμαι
ἐν 'Αμυκλαῖον' πάρα Γέλλωσιν
βάρακες πολλοὶ κάρτοι
καὶ σῶμός τις μάλα ἀδύς,

27. Explain:—

- α'. εὐ γ' ἐξεκολύμβησ' οὐπιβάτης ὡς ἐξοίσων ἐπίγειον.
β'. ὥσπερ κυλικίου τούθονιον προπέπταται.
γ'. τὴν μάλθαγ ἐκ τῶν γραμματείων ἥσθιον.
δ'. μὴ τροπίαν οἶνον φέρε,
ε'. ἀλλ' εἰ σορίλλη καὶ μύρον καὶ ταινίαι
ζ'. διαμασχαλίσας αὐτὸν σχελίσιν καὶ φύσκαις καὶ ῥαφανίσιν,
η'. ἀδαχεῖ γὰρ αὐτοῦ τὸν ἄχορ'.
θ'. τὰ θετταλικά μὲν πολὺ καπανικώτερα.
ι'. ἀλλ' ἢ κοκκύμηλ' ἡκρατίσω.
κ'. τὴν φάρυγα μελῶν δύο δραχμάς ἔξει μόνας.

MR. MAHAFFY,

1. Discuss the evidence on which the Middle Comedy has been separated from the Old and the New.

Explain its relation to Epicharmus.

2. Write a note on the γριῖφος of the Comedians, and give specimens,

3. What was the *Banquet* of Philoxenus? What evidences do the Comic Fragments give us as to peculiarities of dinner parties in various cities?

4. Translate and explain :—

- (a). Ὁ μὲν γὰρ εὐφύης τις εἶναι φαίνεται,
ὥς δ' εὐρύθμως λαβὼν τὸ μελετητήριον
εἴτ' ἐσχεδίασε δρ' μέως ἐν . . . παπαῖ,
μεστὸς γενόμενος πρὸς τὸν Ἀργᾶν βούλομαι
κωδωνίσας πέμψαι σ' ἀγωνιούμενον
ἵνα καὶ σὺ νικᾷς τοὺς σοφιστάς, ὧ φίλε.
- (b). καὶ τοῖς ἑμοῖσιν ἐγγελῶσι πῆμασι
τὰ σῖγμα συλλέξαντες, ὥς αὐτοὶ σοφοί.

Who is the author of the latter passage, and what were the peculiar features of his plays?

5. It is noticed that the conception of Eros in the old lyric poets differs widely from that of the Alexandrians. What evidence can be gathered on this point from the Comic Fragments?

6. Write a note on the arrangements of the markets in Athens, and the customs observed in them.

7. Discuss the ridicule of Plato in the Comedies of this period.

8. Explain and criticise the following words :—

Ἐπικαιρέκακος, ψάγδαν, παραγοράζειν, σφαῖραν ἀπίδειξε, μετάκερας.

9. Translate and explain :—

- (a). Οἶνον πίοις ἂν ἀσφαλέστερον πολὺ
ὑδαρῇ. B. μὰ τὴν γῆν, ἀλλὰ τρία καὶ τέτταρα.
A. οὕτως ἄκρατον, εἰπέ μοι, πῆι; τί φῶς;

Cite a parallel passage from a Latin Comedy.

- (b). Τοὺς Χαιρεφίλου δ' υἱεῖς Ἀθηναίους, ὅτι
εἰσήγαγεν τάριχος, οὗς καὶ Τιμοκλῆς
ιδὼν ἐπὶ τῶν ἵππων δύο σκόμβρους ἐφη
ἐν τοῖς σατύροις εἶναι.
- (c). ἂν δὲ μὴ χαίρῃ γελῶσα, διατελεῖ τὴν ἡμέραν
ἐνδον, ὥσπερ τοῖς μαγείροις ἂ παρῖκειθ' ἐκάστοτε,
ἥνικ' ἂν πωλῶσιν αἰγῶν κρανία, ξυλήφιον
μυρρίνης ἔχουσα λεπτὸν ὀρθὸν ἐν τοῖς χεῖλεσιν
ὥστε τῷ χρόνῳ σέσηρεν, ἂν τε βούλητ' ἂν τε μή.

Give the sense of the context.

10. Discuss the peculiarities of medical practice at Athens.

11. Emend and translate :—

- (a). δειπνεῖ δ' ἄφωνος Τήλεφος, νεύων μόνον
πρὸς τοὺς ἐπερωτῶντάς τι, ὥστε πολλάκις
αὐτὸν ὁ ἐκκληκὼς τὰ Ξαμβρόφκι' εὐχεται
λῆξαι πνέοντα καὶ γαληνίσαι πότε.
χειμῶν ὁ μειρακίσκος ἔστι τοῖς φίλοις.

- (δ). ἡδὺ γε μετ' ἀνδρῶν ἔστι Ἑλλήνων δαί
 συνάγειν· τὸ πρᾶγμα χάριεν, οὗ Χίου δύο
 κυάθους ἰβοήσιν τις ὑπόχει· κωμάσαι
 πρὸς τὴν Ταναγρικὴν δεῖ γάρ, ἵν' ἐκεῖ κατακλιθεῖς
 ἐπιδορπίσῃται τὰς ὀνείας ματῦας.

12. Comment on—

- (α) παράβυστος, μαγαδίζειν, τυρβάζειν, λίπεσθαι. (β) ἡθη, ἀμαρτύ-
 ρητος, ἐπιτόκος, εἰς μακαρίαν, ἀλείπτρια, ὁμνῶν.

13. Explain:—

- (α). ὁ δισπότης δὲ πάντα τὰ παρὰ τοῦ πατρὸς
 ἀπίλαβεν ὥσπερ ἔλαβεν. Β. ἡγάπησεν ἄν
 τὸ ῥῆμα τοῦτο παραλαβὼν Δημοσθίνης.
 (β). πολλοὶ δὲ νῦν μὲν εἰσιν οὐκ ἐλεύθεροι
 εἰς ταῦριον δὲ Σουνιῆς, εἴτ' εἰς τρίτην
 ἀγόρῃ κίχρηται.

14. What is the dispute about the first introduction of *parasites* on the stage?

15. What were the general criticisms on the language of the day made by the poets of the Middle Comedy? and against what classes of society were they directed?

16. What is the Greek equivalent for our *fire-eater*? In what connexion does the expression occur?

17. What can be gathered from the Fragments as to the reputed character of Demosthenes and Hyperides?

18. Translate:—

τίς ἄν λάβοιτο τοῦ σκίλους κάτωθι μοι;
 ἄνω γὰρ ὥσπερ κοττάβειον αἶρομαι.

DR. INGRAM.

Translate the following passage into Greek Comic Verse:—

A good sherries-sack hath a twofold operation in it. It ascends me into the brain, dries me there all the foolish, and dull, and crudy vapours which environ it, makes it apprehensive, quick, forgetive, full of nimble, fiery, and delectable shapes; which, deliver'd o'er to the voice, which is the birth, becomes excellent wit. The second property of your excellent sherris is the warming of the blood, which before, cold and settled, left the liver white and pale, which is the badge of pusillanimity and cowardice; but the sherris warms it, and makes it course from the inward to the parts extreme. It illumineth the face, which, as a beacon, gives warning to all the rest of this little kingdom, man, to arm; and then the vital commoners, and inland petty spirits, muster me all to their captain the heart, who, great and puffed up with this retinue, doth any deed of courage: and this valour comes of sherris: so that skill in the weapon is nothing without sack, for that sets it a-work, and learning a mere hoard of gold kept by a devil, till sack commences it, and sets it in act and use.—SHAKESPEARE.

h

EXAMINATION FOR CLUFF MEMORIAL PRIZE.

 PROFESSOR DOWDEN.

1. "Successive Pontiffs had refused him the pallium so that Rouen was now in much the same case as Canterbury." Of whom is Mr. Freeman speaking? State what you know of fact and legend about this person.

2. "Des lances fierent chevaliers,
Et o les ars traient archiers."

Give an account of the battle in Wace's description of which these lines, containing the first mention of Norman archers, occur.

3. What account is given by Wace of the negotiations of William with his Barons relative to the invasion of England?

4. The entries in the Worcester and in the Peterborough Chronicles for 1067, 1068, 1069, suffer under some chronological confusion. How is this explained by Mr. Freeman?

5. "On þære ilcan tide sende se kyng of Francrice Filippus gewrit to him, and bead him þæt he to him côme, and he wolde geofan him þone cástel æt Mustraël."

With what object did Philip make this offer? Relate what followed.

6. "And her ferde Gyða út Haroldes modor and manegra godra manna wif mid hyre into Bradan Reolice."

On what occasion did this take place? To what place did Gytha subsequently withdraw?

7. In which of the Chronicles is the battle of Stamford Bridge related with fullest detail? What is Mr. Earle's conjecture in explanation of this circumstance?

8. At the blockade of Arques some of the most important operations in opposing the relief of the Castle were left to others by William. The cause is assigned by William of Malmesbury. Illustrate by similar examples.

9. By what arguments, according to William of Malmesbury, did Harold endeavour to justify his non-observance of the oath sworn to William?

10. "Instead of any distinct account of William's negotiations with his father-in-law [previous to the invasion of England] we get only an unintelligible romance."

What is this romance referred to by Mr. Freeman?

11. What, according to Wace, was the last act of the battle of Senlac?

12. A subsequent fact stated by William of Malmesbury is hardly consistent with his statement that Harold refused to divide among the victors the plunder of the battle of Stamford Bridge?

13. Wace, in his account of the landing of William in England, and his immediately subsequent movements, is guilty of a geographical blunder?

14. The evidence of the Chronicles and that of Florence can hardly be accepted in some important particulars with respect to the submission to William at Berkhamstead?

15. Some doubt attaches to William of Malmesbury's entire account of the siege of Exeter in consequence of a various reading in the MSS.?

16. What account is given by William of Malmesbury of the death of William Fitz Osborn?

17. Write a note upon the special value of Florence as a historian. In what relation does his history stand to the Anglo-Saxon Chronicles?

18. What account is given by Florence of the method by which patriots of the Isle of Ely were subdued (1071)? Make clear the geography of this district.

PROFESSOR BARLOW.

1. Give as accurate a description as you can of the compartment of the Bayeux Tapestry superscribed with the legend—"Hic Willem dux et exercitus ejus venerunt ad montem Michaelis et hic transierunt flumen Cosnonis hic Harold dux trahebat eos de arena et venerunt ad Dol et Conan fuga vertit Rednes hic milites Wilhelmi pugnans contra Dinantes et Cunan claves porrexit."

2. What testimony is supplied by the Tapestry with respect to the following points—the ships, the weapons, the armour of the combatants, the defensive operations of William?

3. What inference may be deduced from it concerning the famous charge of Taillefer at Senlac?

4. Wilhelmus Gemiticensis writes—"Sic omnipotens Deus pridie Idus Octobris, (MLXVI,) innumeros peccatores utriusque phalangis punit diversis modis." To what does he refer?

5. He tells us also that—"Tempore quo Wilhelmus Dux disponebat Angliam adire, et armis eam sibi vendicare, audax Chunanus nisus est eum terrere." How?

6. "Sed mox eum Deus eripere dignatus est." How?

7. What is the testimony of Ordericus Vitalis as to the origin and extent of the historical works of Wilhelmus Gemiticensis?

8. Give, as fully as you can, Orderic's account of William's campaigns in the north of England.

9. Orderic gives some instances of gross abuse of ecclesiastical patronage by the Normans in England? He transcribes a very remarkable letter of Guitmundus, afterwards Bishop of Aversa, to William. What was the substance of this?

10. Give the substance of William's dying speech, as related by Orderic. Mention, in particular, the grievous injuries with which he charges his subjects.

11. Mr. Freeman remarks that "the development of the young Duke [William] both in mind and body was undoubtedly precocious; but his early maturity was mainly owing to the stern discipline of his terrible childhood." Illustrate this statement from the work of Wilhelmus Gemiticensis.

12. What account is given by Wilhelmus Pictaviensis of the Norman rebellion which was suppressed by the battle of Valesdunes?

13. Ordericus Vitalis makes a curious statement concerning the siege of Brionne after this battle? What account does Wil. Pict. give of this siege?

14. Give his account of the great rebellion of Count William of Arques. What does he mean by saying "Cernit tandem angustiarum oculo Papiæ partus rapiendi contra dominum suum principatus cupidinem malesuadam esse"?

15. What does he tell us of (a) the Archipræsul Malgerius, (b) Gaufrerus Martellus?

16. What account does Orderic give of the quarrel between William and his eldest son?

BIBLICAL GREEK PRIZE EXAMINATION.

PROFESSOR SIDNEY SMITH.

The Epistle to the Hebrews.

1. State some of the chief passages in the Epistle which bear on the question of the authorship, and explain how.

2. What reasons are mentioned by Alford against the supposition that the Epistle was written for readers in Palestine; and for that, that it was for persons at Rome?

3. How, in reference to this question, are we to understand ὡς ἀναθιωροῦντες τὴν ἐκβασιν τῆς ἀναστροφῆς, μιμίσθε τὴν πίστιν? Who were the persons here intended?

4. What is the theory of Delitzsch?

5. καθαρισμὸν τῶν ἁμαρτιῶν ποιησάμενος. How does Ebrard explain the true meaning of καθαρισμὸν, and illustrate it from the great day of atonement?

6. ὅταν δὲ πάλιν ἰσαγάγῃ τὸν πρωτότοκον εἰς τὴν δίκουμένην λίγαι, καὶ προσκυνησάτωσαν αὐτῷ πάντες ἄγγελοι Θεοῦ. State the different renderings, and which is to be chosen; also the place from which the quotation is made.

7. What is the force of the tense of ἰσαγάγῃ? What would be the sense if it were the future indicative with ὅτε?

8. ὁ ποιῶν τοὺς ἀγγέλους αὐτοῦ πνεύματα καὶ τοὺς λειτουργοὺς αὐτοῦ πυρὸς φλόγα. What construction is grammatically necessary? and why? And then what is the sense?

9. ὁ θρόνος σου ὁ Θεὸς εἰς τοῦ αἰῶνα τοῦ αἰῶνος. Defend our E. V. here, and refute the Socinian rendering.

10. παρὰ τοὺς μετόχους σου. Who are meant? Assign some reasons for your opinion.

11. μή ποτε παραρῶμεν. Give the sense, stating also the verb and tense here used.

12. Show how the E. V. and Vulgate are erroneous.

13. ὁ δὲ ἀγγέλων λαληθεὶς λόγος. Give the parallel passages that fix the sense.

14. τὴν δικουμένην τὴν μέλλουσαν περὶ ἧς λαλοῦμεν. What is Alford's view? Give also that of Theophylact and Chrysostom.

15. τί ἐστι ἄνθρωπος, κ. τ. λ. What is the discrepancy between the apparent sense of the Psalm and the purport of the quotation from it? Can you clear it up?

16. τὸν δὲ βραχύ τι παρ' ἀγγέλους ἡλαττωμένον βλέπομεν Ἰησοῦν διὰ τὸ πάθημα τοῦ θανάτου δόξῃ καὶ τιμῇ ἱστεφανωμένον, ὅπως χάριτι Θεοῦ ὑπὲρ παντὸς γευσήται θανάτου. What construction of the participles is grammatically necessary?

17. To what is διὰ τὸ πάθημα τοῦ θανάτου related, and in what sense?

18. State the difficulty as to the design implied in ὅπως, and any probable solution of it; also show the error of supposing it to have the meaning of ὅταν.

19. Give the various reading of χάριτι Θεοῦ; the authority for it; its relation to the Nestorian controversy.

20. βραχύ τι. Give examples of its being used of time.

21. Translate the whole passage.

22. Καὶ πάλιν, ἐγὼ ἔσομαι πεποιθὼς ἐπ' αὐτῷ. Why is it probable this is cited from Isaiah? Point out its connexion with the argument.

23. τὸν διάβολον—ὃς ἔχει τὸ κράτος τοῦ θανάτου· πῶς; How does Theophylact answer this, his own question?

24. How does Ebrard explain το κράτος τοῦ θανάτου?

25. οὐ γὰρ δήπου ἀγγέλων ἐπιλαμβάνεται, κ. τ. λ. Give the right rendering of this, explaining δήπου, and establishing the sense of ἐπιλαμβάνεται.

26. How was the view of the ancient expositors connected with the way in which the Greek Church used the words λαμβάνειν and ἀναλαμβάνειν? State why this view is incorrect.

27. πλείονος γὰρ οὗτος δοξῆς παρὰ Μωυσῆν ἡξιώται, καθ' ὅσον πλείονα τιμὴν ἔχει τοῦ οἴκου ὁ κατασκεύασας αὐτόν· πᾶς γὰρ οἶκος κατασκευάζεται ὑπὸ τινός, ὁ δὲ πάντα κατασκεύασας Θεός. What is the probable sense and course of the reasoning here?

28. Is it necessary to adopt Alford's ungrammatical rendering?

29. "Some when they had heard did provoke; howbeit not all that came out of Egypt by Moses." Give the amended translation, and the reasons for it.

30. Explain the difference of the two readings *τινες γὰρ ἀκούσαντες* and *τινὲς γὰρ ἀκούσαντες* (giving the grammatical rule).

31. "Let us therefore fear, lest a promise being left us of entering into his rest, any of you should seem to come short of it." Show how the meaning of the words rendered—"a promise being left"—is affected by the Greek tense.

32. Discuss *δοκῇ τις ἐξ ὑμῶν ὑστερηκίναί*, giving the two possible interpretations, and those that must be rejected.

33. What is Alford's view of *δοκῇ*? Which is this or Ebrard's best sustained by the *usus loquendi* in the N. T.?

34. How is the tense of *ὑστερηκίναί* accounted for?

35. "The word preached did not profit them, not being mixed with faith in them that heard it."—State the various reading, and the interpretation given by those adopting the *textus receptus*. What is Ebrard's idea?

36. Alford argues against this view from the use of *μὴ* in the phrase "not being mixed," and from the article before *πίστει*. Explain clearly the grammatical principles which he reasons from.

37. What is his own exposition?

38. Give the view of Tholuck and Delitzsch stating the force and government of the datives *τῇ πίστει* and *τοῖς ἀκούσασιν*, and translating accordingly. What is the reading of *συγκεκριμενός*?

39. *εἰσακουσθεὶς ἀπὸ τῆς εὐλαβείας*. The words have been understood in three different ways?

40. Tholuck denies the meaning of *ἀπὸ* used as in E. V. Give scriptural examples of such use.

41. State the objections of Alford to the two views which he rejects.

42. "For when God made promise to Abraham, because he could swear by no greater, he swore by himself, saying, surely blessing," &c. "And so, after he had patiently endured, he obtained the promise." The first part of this passage is referred to Gen. xxii., viz, the oath after the offering of Isaac; the latter part to the birth of Isaac. How, then, could the oath help Abraham to patiently endure for the fulfilment of the promise? Another view of the *ἔρκος* may be taken, which would remove the difficulty?

43. "For there is verily a disannulling of the commandment going before, for the weakness and unprofitableness thereof. For the law made nothing perfect, but the bringing in of a better hope did." Correct the E. V. here, and state what is the view of most ancient and modern expositors as to the *ἐντρολή* here (against Alford).

44. State the different modes of rendering the passage (of Erasmus, Beza, Bleek).

45. Give Alford's definitions of the two species of *διαθήκη*.

46. "An unchangeable priesthood." What is the marginal rendering of the E. V. ? Discuss the authority for each.

47. In like manner, examine the question of the meaning of *ἐς τὸ παντελές*.

48. *ἀρχιερεὺς ὁσιος ἀκακος ἀμιάντος κειχωρισμένος ἀπὸ τῶν ἀμαρτωλῶν*. Is the meaning here identical with that in ch. iv. *πεπειρασμένον—χωρὶς ἀμαρτίας*? If not, what is it?

49. "Who needeth not daily, as those high priests, to offer up sacrifice, first for his own sins, and then for the people's: for this he did once, when he offered up himself." Some render *καθ' ἡμέραν* differently?

50. Our English rendering causes difficulty when compared with the rest of the passage?

51. How is this difficulty solved?

52. *καίτοι τῶν ἔργων ἀπὸ καταβολῆς κόσμου γενηθέντων*. State the sense given to *καίτοι* by Calvin, Beza, and others, and show it to be wrong; giving also the erroneous interpretation of the whole passage connected with it.

53. *βαπτισμῶν διδασχῆς*. What is Winer's rendering and interpretation? How does he defend it by a parallel passage?

54. How does Delitzsch dispose of it?

55. *τὸ δὲ ἐτι ἀπαξ ὅλοϊ τῶν σαλευομένων τὴν μεταθίσειν ὡς πεποιημένων, ἵνα μείνῃ τὰ μὴ σαλευόμενα*. State the three ways of taking this passage.

56. Why does Alford object to the view which connects *ἵνα* with *πεποιημένων*?

57. The E. V. is not correct here?

58. What is the objection to taking *μείνῃ* in the sense of 'wait for'?

59. What is the interpretation of the words by M'Caul?

60. How does he explain and illustrate by parallels from this Epistle *ὡς πεποιημένων*?

61. Give the passage from Haggai, stating how 'the desire of all nations' is in the Hebrew and in the Greek?

62. What objections by Faussett to Alford's rendering of *ἔχωμεν χάριν*?

63. Translate correctly:—

(a). *ἐκφύρουσα δὲ ἀκάνθας καὶ τριβόλους ἀδόκιμος*.

(b). *ἀπαράβατον ἔχει τὴν ἱερωσύνην*.

64. The active sense of *ἀπαραβάτον* is adopted by some ancient and modern writers (*ἀδιάδοχον*); how is this shown to be erroneous both from its form and its origin?

65. What is the correct sense?

66. *βουλόμενος ὁ Θεὸς ἐπιδείξει τοῖς κληρόνομοις τῆς ἐπαγγελίας τὸ ἀμετάθετον τῆς βουλῆς αὐτοῦ ἐμεσιτευσεν ὄρεψ*. How does Delitzsch distinguish *θίλειν* and *βούλεσθαι*?

67. Discuss *ἐμεσιτευσεν*. On what occasion was this?

68. οὗτος γὰρ ὁ Μελχισεδέκ βασιλεὺς Σαλήμ. Delitzsch contends that Salem is Jerusalem, from the Psalms, and from topographical considerations; how?

69. Enumerate some of the chief interpreters who make Melchizedek to be an incarnation of the λογος.

70. μένει ἱερεὺς εἰς τὸ διηνεκές. What fault is found with Alford's rendering, and on what grounds?

71. Give the explanation of διηνεκες in N. T. Also give its etymology.

72. ἐντολὴν ἔχουσιν ἀποδεκατοῖν τὸν λαὸν κατὰ τὸν νόμον, τουτέστιν τοὺς ἀδελφούς αὐτῶν. State the difficulty, and the best mode of solving it, according to Delitzsch.

73. What was the law of the Therumah referred to?

74. μαρτυρούμενος ὅτι ζῇ. How explained by Delitzsch?—by M'Caul?

75. ἐντόλης σαρκίνης—ζωῆς ἀκαταλύτου. How are these to be rendered, having regard to the position of the adjectives?

76. ὅπου γὰρ διαθήκη, θάνατον ἀνάγκη φέρεσθαι τοῦ διαθεμένου· διαθήκη γὰρ ἐπὶ νεκροῖς βεβαία, ἐπεὶ μὴ ποτε ἰσχύει ὅτε ζῇ ὁ διαθίμενος. State Ebrard's view, taking διαθηκη as a covenant, and the objections to it.

77. Pierce gives a different interpretation, still understanding διαθήκη as a covenant?

78. How does he take ὁ διαθίμενος, and defend his rendering?

79. Explain θάνατον φέρεσθαι.

80. εἰς τὸ πολλῶν ἀνενεγκεῖν ἁμαρτίας. Delitzsch rejects the view of Chrysostom and of Luther of ἀνενεγκεῖν. What are they, and what is his own? What is that of Professor Lightfoot?

81. Χωρὶς ἁμαρτίας. Give the different interpretations, and that preferred by Delitzsch.

82. ὅθεν αὐτὸν καὶ ἐν παραβολῇ ἐκομίσατο. Give the various interpretations of ὅθεν, of παραβολή, and of the whole sentence.

83. προσεκύνησεν ἐπὶ τὸ ἄκρον ῥάβδου αὐτοῦ, How did the divergence of this from the Hebrew originate?

84. How is the passage interpreted by Jerome and Chrysostom?

85. How rendered in the Latin?

86. μετανόιας γὰρ τόπον οὐχ εὔρειν. Give your reasons for preferring one of the two possible interpretations here.

87. "Now faith is the substance of things hoped for, the evidence of things not seen." Discuss the words rendered 'substance' and 'evidence,' establishing the true and refuting the erroneous meanings.

88. Why is it inaccurate to speak of this as a definition of faith?

89. εἰς τὸ μὴ ἐκ φαινομένων τὸ βλέπόμενον. Is this telic or ecclastic?

90. If μὴ appertain to φαινομένων, what two interpretations result?

91. If not, how does Alford take it?

92. ἀδύνατον ἐβαρεσθῆσαι. Give the force of the aorist here.
93. ἐλάβηθεις. Give the correct sense, and prove it.
94. "By faith Abraham when he was called," &c. What is the various reading, and the different senses resulting?
95. καὶ μυριάσιν ἀγγέλων πανηγύρει καὶ ἐκκλησίᾳ πρωτοτόκων ἀπογεγραμμένων ἐν οὐρανοῖς. There are four modes of punctuation, viz., the comma being placed after πανηγυρεῖ alone, or after both it and ἀγγέλων; or after both μυριάσιν and πανηγύρει; or after ἀγγέλων only, or after μυριάσιν only. What is adopted by E. V., and why objected to?
96. What objection to punctuating after ἀγγέλων only?
97. Explain and translate according to the last mode.
98. How does M'Caul illustrate the passage from Deut. xxxiii.?
99. A passage in Zechariah serves as a parallel to "ye have come to μυριάσιν ἀγγέλων"?
100. Write a note on πανήγυρις.
101. ἀπογεγραμμένοι ἐν οὐρανοῖς. Discuss the question, who these are—whether in heaven or earth—according to Alford? giving his reasons.
102. How does Faussett differ from him?
103. πνεύμασι δικαίων τετελειωμένων. In what sense is τετελ. according to Alford, and according to Faussett?
104. αἵματι ῥαντισμοῦ κρεῖττον λαλοῦντι παρὰ τὸν Ἀβελ. State briefly Bengel's view of the αἷμα.
105. What means παρὰ τὸν Ἀβελ? Correct the E. V.
106. State the view of Archbishop Magee.
107. The correct reading is of importance in the interpretation here?
108. ψηλαφωμένοι. Various interpreted?
109. καὶ οὕτως φοβερὸν ἦν τὸ φυνταζόμενον Μωσέως εἰπεν Ἐκφοβος εἰμι καὶ ἔντρομος. Give the different punctuations and renderings; and say where the words of Moses are taken from.
110. φωνῇ ῥημάτων. What is the passage in Deuteronomy referred to here?
111. State some of the opinions as to whether there was a Divine utterance of the Ten Commandments, or of some of them?
112. What does Josephus say?
113. ἀλλὰ προσεληλύθατε Σιων ὄρει, κ. τ. λ. Give Bengel's two groups of the seven earthly and seven heavenly in the passage.
114. Correct the E. V. in the following:—
- (a). "An oath for confirmation is to them an end of all strifa."
- (b). "And a worldly sanctuary."
- (c). "With those sacrifices which they offered."
- Showing what is the grammatical error in each case.

115. Also correct and amend —

- (a). "Leaving the first principles of the doctrine of Christ."
- (b). "Bringeth forth herbs meet for them by whom it is dressed."
- (c). "On them that are out of the way."
- (d). "When for the time ye ought to be teachers."

116. *ἐποιήσεν τοὺς αἰῶνας—κατηρτίσθαι τοὺς αἰῶνας ῥήματι Θεοῦ.*
Mention the different senses assigned to *αἰῶνας*, and Alford's reasons for his view.

THEOLOGICAL EXHIBITION EXAMINATION.*

THE PROFESSOR OF DIVINITY.

1. What is the title of Irenæus's work against heresies, as given by Eusebius? What other works of Irenæus does Eusebius mention?

2. To which of them was the adjuration added?

3. Translate:—

Εἰ γὰρ ᾔδειμεν τόπον τινὶ δικαιοσύνην περιποιεῖσθαι, ὡς πρεσβύτερον ἐκκλησίας, ὅπερ ἐστὶν ἐπ' αὐτῷ, ἐν πρώτοις ἀν παρεθέμεθα.

4. To what disputed verses in the received text of the New Testament is witness borne in the third book of Irenæus?

5. Irenæus agrees with Codex D in a remarkable variation from the received text of the injunctions of the apostolic letter, Acts xv.?

6. Which only of the early Roman bishops is described by Irenæus as having suffered martyrdom?

7. How does Tertullian (*De Præscrip.*) differ from the account given by Irenæus of the first Roman bishops?

8. What use did the opponents of Irenæus make of the texts, "He judgeth among the gods," and "the god of this world hath blinded the minds of them which believe not"? How does Irenæus reply?

9. Translate:—

Hos angelos falsarii Gnostici dicunt ab ogdoade venisse, et descensionem superioris Christi manifestasse. Sed corruunt iterum dicentes eum qui sursum sit, Christum et Salvatorem, non natum esse, sed et post baptismum ejus qui sit de dispositione Jesu, ipsum sicut columbam in eum descendisse. Mentuntur ergo ogdoados angeli secundum eos, dicentes: Quoniam generatus est hodie vobis Salvator, qui est Christus Dominus in civitate David. Neque enim Christus, neque Salvator, tunc natus est secundum eos: sed ille, qui est de dispositione Jesus, qui est mundi fabricatoris, in quem post baptismum descendisse, hoc est post triginta annos, supernum Salvatorem dicunt.

* The greater part of this Examination is conducted *vivâ voce*.

10. Translate :—

Hi enim ad multitudinem propter eos qui sunt ab Ecclesia, quos communes et Ecclesiasticos ipsi dicunt, inferunt sermones, per quos capiunt simpliciores, et illicunt eos, simulantes nostrum tractatum, ut sæpius audiant, qui et jam queruntur de nobis, quod cum similia nobiscum sentiant, sine causa abstineamus nos a communicatione eorum, et cum eadem dicant, et eandem habeant doctrinam, vocemus illos hæreticos : et cum dejecerint aliquos a fide per quæstiones, quæ fiunt ab eis, et non contradicentes auditores suos fecerint, his separatim inenarrabile plenitudinis suæ enarrant mysterium. Decipiuntur autem omnes, qui quod est in verbis verisimile, se putant posse discere a veritate. Suasorius enim et verisimilis est, et exquirens fucos error : sine fucis autem est veritas, et propter hoc pueris credita est. Et si aliquis quidem ex his qui audiunt eos, quærat solutiones, vel contradicat eis, hunc quasi non capientem veritatem, et non habentem de superioribus a matre sua semen affirmantes, in totum nihil dicunt ei, mediarum partium dicentes esse illum, hoc est psychicorum. Si autem aliquis quasi parvam ovem, deditum semetipsum ipsis præbeat, imitationem illorum, et redemptionem illorum consecutus, est inflatus iste talis, neque in cælo, neque in terra putat se esse, sed intra Pleroma introisse, et complexum jam angelum suum, cum in-istorio, et supercilio incedit, gallinacei elationem habens.

11. Translate and explain :—

Quemadmodum Cain cum accepisset consilium a Deo uti quiesceret in eo quod non recte divisisset eam quæ erga fratrem erat communicatio- nem, sed cum zelo et malitia suspicatus est posse dominari ejus, non solum non acquievit, sed et adjecit peccatum super peccatum, manifestans sententiam suam per operationem suam.

12. How did Tertullian read the text, "A man that is a heretic, after the first and second admonition, reject" ?

13. What account does Tertullian give of the history of Marcion, and of the time when he taught ?

14. Translate ;—

"Viderit qui quærit semper, quia non invenit; illic enim quærit ubi non invenietur: Viderit qui semper pulsatur, quia nunquam aperietur; illic enim pulsatur ubi nemo est."

"Novissime, ignorare melius est, ne quod non debeat noris, quia quod debeas nosti: Fides, inquit, tua te salvum fecit, non exercitatio scripturarum. Fides in regula posita est: habes legem, et salutem de observatione legis, exercitatio autem in curiositate consistit habens gloriam solam de peritiæ studio. Cedat curiositas fidei, cedat gloria salutis."

"Nec mihi tum bene est, iam nec tam male est, ut apostolos commit- tam."

REV. GEORGE LONGFIELD, D. D.

Isaiah, xxviii.—xxxv.

1. xxviii. 9—11—

את-מִי יוֹרָה דַּעַה וְאֶת-מִי יִבִּין שְׁמוּעָה
 גְּמוּלִי מִחֶלֶב עֲתִיקִי מִשְׁדָּדִים : כִּי צוֹ לָצוֹ צוֹ לָצוֹ
 קוֹ לָקוֹ קוֹ לָקוֹ זַעֲרִי שֵׁם זַעֲרִי שֵׁם : כִּי בִלְעֵנִי
 שִׁפָּה וּבִלְשׁוֹן אַחֶרֶת יִדְבֹּר אֶל-הָעָם הַזֶּה :

a. Translate this passage, and write a paraphrase of it, showing your view of the meaning and connexion.

b. Give Jerome's rendering and explanation of v. 10.

c. Notice a grammatical peculiarity in v. 9. Give the primary meanings of the verbs יִרָה, יִבִּין.

2. xxx. 13—

וַיֹּאמֶר אֲדֹנָי יֵשׁוּ כִּי נִנְשׁ הָעָם הַזֶּה בְּכִפּוֹ
 וּבִשְׁפָתָיו כִּבְדוּנִי וּלְבָבוֹ רָחַק מִמֶּנִּי וְתִהְיֶי יִרְאָתָם
 אֹתִי מִצֹּת אֲנָשִׁים מִלְמָדָה :

a. Some MSS. give another reading for נִנְשׁ : what is it, and what would it mean ?

b. Explain the Masoretic note on the word, ל' בספרא, and show that it confirms the reading נִנְשׁ.

c. Point out a syntactical peculiarity in the latter clause of the verse.

d. The rendering of the latter clause in the LXX., and in the New Testament (Matt. xv., Mark vii.), has been accounted for by the different reading of a single letter of the Hebrew ?

3. xxx. 6, 7—

מִשָּׂא בְּהִמּוֹת גָּבַב בְּאֶרֶץ צָרָה וְצוּקָה לָבִיא

וְלִישׁ מִהֶם אִפְעָה וְשָׁרַק מְעוֹפֵף יִשְׂאוּ עַל-פִּתְּהָ
 עוֹרִים הִילִיחֵם וְעַל-רִבְשָׁת גְּמִלִים אוֹצְרוֹתָם עַל-עַם
 לֹא יוֹעִילוּ: וּמִצִּיֹּם הַבֵּל וְרִיק יַעֲזֹרוּ לָבֹן קִרְאָתִי
 לְזֹאת רֹהֵב הֵם שָׁבַת :

a. Translate this passage, adding short notes on the chief difficulties it presents.

b. How does the Vulgate render the latter clause of v. 7? If this rendering be correct, how should the pointing be changed?

c. Explain Iarchi's paraphrase of this clause,

רִיזָאת לְמִזְרֵם רֹהֵב הֵם נְסִי הַרוּחִי שֶׁבַת עִם בִּטּוֹל

4. xxxii. 13-15—

עַל אֲדָמַת עֲפִי קוֹץ שְׁמִיר תַּעֲלֶה כִּי עַל-
 כָּל-בִּתִּי מְשׁוֹשׁ קָרִיָּה עֲלִיתָה: כִּי-אֲרָמֹן גִּפְשׁ
 הַמֶּזֶן עִיר אֶגֶב עָפַל וּבָחוּן הָיָה בְּעַד מַעֲרוֹת
 עַד-עוֹלָם מְשׁוֹשׁ פָּרָאִים מִרְעָה עֲדָרִים: עַד-הַיַּעֲרָה
 עָלֵינוּ רוּחַ מִמָּרוֹם וְהָיָה מִדְּבָר לִפְרָמָל וּפְרָמָל
 לַיַּעַר יִחַשֵׁב :

a. Translate, adding such short notes as appear necessary.

b. How has כִּי v. 13, been explained as a noun? The word appears to be used as a noun in another passage of Isaiah?

c. According to the accentuation the rendering of the latter clause of v. 13, in the Authorized Version, is inaccurate?

5. xxxiv. 7, 8—

הֵן אֲרָאֵלִם צָעֲקוּ הִצָּה מִלֵּאכֵי שְׁלוֹם מֶרֶ

יִבְכּוּן : נִשְׁמּוּ מִסְּלוֹת שָׁבַת עֲבָר אֶרֶח הַכָּר
בְּרִית מָאֵם עָרִים לֹא חָשַׁב אֲנֹשׁ :

a. Translate this passage, and explain the historical allusion in it.

b. Write a note on the word אֶרֶח. How probably should it be pointed? How is it expressed in the ancient versions?

6. Translate into Hebrew the following :—

“O LORD, thou *art* my God: I will exalt thee, I will praise thy name; for thou hast done wonderful *things*; thy counsels of old *are* faithfulness *and* truth.

“For thou hast made of a city a heap; of a defenced city a ruin: a palace of strangers to be no city; it shall never be built

“Therefore shall the strong people glorify thee, the city of the terrible nations shall fear thee.

“For thou hast been a strength to the poor, a strength to the needy in his distress, a refuge from the storm, a shadow from the heat, when the blast of the terrible ones *is* as a storm *against* the wall.”

EXAMINATION FOR THE WRAY PRIZE.

SCHWEGLER, MILL, AND HAMILTON.

DR. SHAW.

1. Indicate the points of resemblance between the Greek Sophists, as described by Schwegler, and the Journalists of our own time.

2. (a). Describe the Socratic method both in its negative and its positive side; and (b) correct Schwegler's interpretation of the saying of Hegel that Socrates substituted *moralität* for *sittlichkeit*.

3. (a). Give the five heads of the polemic against the Protagorean theory of cognition, as that polemic is gathered from the Theætetus; and (b) illustrate Schwegler's language by parallel expressions of Hamilton's and Kant's. Restore the sense of the third head from the non-sense which the translation makes of it.

4. Hamilton lays down three propositions respecting Memory, Consciousness, and Knowledge, from any two of which may be derived the contradictory of the third?

5. (a). Criticise the Platonic Theory of Ideas from the Aristotelic point of view; and (b) name and describe the entities substituted for it by Aristotle, as an explanation of the existence, genesis, and dissolution of sensible things.

6. (a). Describe the general character of Jacob Böhm's theosophy; and (b) quote its central principle. (c) Indicate his points of contact and of contrast with Heraclitus, Spinoza, Des Cartes, Schelling, and Professor Mac Ivor.

7. Sketch the outlines of the philosophy of Des Cartes, briefly criticising (a) his criterion of certainty; (b) his constitution of subjective personality; (c) his proof and that of St. Anselm of the existence of God; and (d) his account of the nature of matter, and its cognoscibility.

8. (a). Arrange the following philosophers under their proper categories in Hamilton's classification of Theories of Perception:—Leibnitz, Des Cartes, Kant, Hume, Hegel, Plato, Aristotle, and his mediæval followers, Reid, Democritus, Condillac, Arnauld, Browne, and Cousin.

(b). What theory of perception would be designated by the name Nouthetic Sensualism?

9. (a). Give the principal points made on either side of the question whether propositions which are unimaginable differ from those which are merely incredible in kind, or only in degree.

(b). Consider whether the propositions mentioned by Mill as lying "on the border land" do not tell in favour of Mr. Mahaffy's view rather than, as Mill thinks, against it.

10. The process by which we infer that other finite beings than ourselves exist, loses none of its legitimacy on the supposition that mind and matter are nothing but permanent possibilities of feeling. Prove this, and reply to the objections, major and minor, urged against the proof by Mr. O'Hanlon.

11. Write brief notes on the following points in the discussion respecting the idea of Space:—

(a). Importance of the question, according to Locke, Reid, and Stewart.

(b). Mr. Bain's account of the Sense of Range, in its most primitive and elementary form.

(c). Dilemma to which Hamilton tries to reduce the theory of Brown.

(d). Implied premiss which Brown ought to have stated explicitly.

(e). Ultimate analysis of linear extension.

(f). Simultaneity of Space how distinguished from simultaneity of heterogeneous sensations.

(g). Real mistake of Brown, and Mill's apology for it.

(h). Sole difference between the Intuitionists and the Psychologists respecting the nature of Space.

(i). Plattner's misinterpretation of the phenomena that he observed.

12. (a). Draw out Hamilton's tabular view of the theories which have been propounded respecting the principle of Causality; adding brief notes on (b) the intention and effect of Hume's argument, and the source from which he derived it; (c) the sophism of the Leibnitzians; (d) Brown's statement of the question, and Professor Wilson's criticism thereon; (e) the theories of Maine de Biran, Mill, Kant, Cousin, Des Cartes, and Reid; (f) the ambiguous utterances of Locke; and (g) the solution offered by Hamilton himself.

BUTLER, MILL'S LOGIC, AND BACON.

DR. STUBBS.

1. Butler gives several instances in which Virtue, *as such*, is actually rewarded, and Vice, *as such*, actually punished. Specify them. In one case death and public disgrace is the punishment of Vice, as Vice.
2. Butler instances an objection to God's government which shows that the notions of justice and injustice force themselves on the mind even while we are making suppositions destructive of them. What conclusion does he say is contradicted by the rewards and punishments naturally following from gratitude and resentment?
3. What five cases does Butler cite from natural information in order to show that it is likely that we should fall into error in *a priori* speculations with respect to revelation? He mentions four instances of objections which prior to experience men might bring against God's present natural mode of informing man?
4. The doubtfulness of the evidence upon which we act in our temporal matters is as great as that of religion? What circumstances in men's situation in their temporal capacity are similar to speculative difficulties with regard to religion?
5. The observation that "man is by nature a law to himself" leads to consequences of the utmost importance? Why is it so?
6. What are the chief instances of the abuse of deliberate resentment? Two abuses of anger?
7. The calm satisfaction which accompanies compassion proceeds from two sources? One of them is like a bodily feeling?
8. The question whether we ought to love God for His own sake has been mistaken for another? What is the answer to the real question?
9. In Mill's view how far is a science *experimental*, and how far *deductive*? What are the discoveries which mostly change the method of a science from the former to the latter class?
10. The method of Concomitant Variations may be usefully employed after the method of Difference—in what way? When applied to cases in which the variations are those of quantity, two cautions must be kept in view?
11. What condition of a genuine scientific hypothesis is laid down by Mill?—and in what three classes of cases is it fulfilled?
12. There are two kinds of propositions which assert uniformity of co-existence between properties: to what may each be reduced?
13. Three possible methods of experimenting are described and illustrated by Bacon?

DR. TABLETON.

1. Describe accurately the mode in which, according to Mansel, an extra organic world manifests itself.
How are the primary qualities of body immediately given, and why are they apprehended as forming the essential attributes of all matter?

The senses cannot in any case furnish direct evidence of the existence or properties of an extra organic world ?

2. How does Mansel differ from Stewart in reference to the state of the mind in dreams, and what arguments does he bring forward to support his theory ?

How are the phenomena of Somnambulism and Mesmerism accounted for by Bain ?

3. What is the exact assumption made by Mansel in his account of the origin of the Principle of Causality ?

4. Starting from a fact which is put prominently forward by Bain, Mansel establishes the existence of a Permanent Self by the fallacious use of a principle borrowed from Kant ?

5. How does Mansel show that it is not correct to say that the individual alone is perceived first, and the general notion formed from it by abstraction ?

How does he describe the process which really takes place ?

6. What, according to Mansel, is the meaning of Kant's principle that the Understanding has no power of intuition ?

Mansel deduces consequences from this principle which cannot be inferred from it when rightly understood ?

7. Mansel limits more absolutely than Kant the field within which Thought may be exercised, and bases his limitation on a different principle ?

8. What is Mansel's criticism on the statement made by Leibnitz and Hegel that Arithmetical processes are operations of pure analysis ?

His criticism does not establish in a satisfactory manner the synthetical character of Arithmetical truths ?

How may the defect be remedied ?

How does Mansel get over the difficulties involved in the assertion that judgments in reference to the addition of large numbers are synthetical ?

What is the true account of the mode in which these judgments are formed ?

1. The relation indicated by Kant between the chief two preceding schools of philosophy and his own in reference to knowledge is analogous to that between the three principal schools of ancient philosophy in reference to the chief good ?

2. Give a sketch of the methods by which Kant establishes the validity of the distinction between objects of experience and things in themselves.

3. The Reason in the more restricted sense does not differ so essentially from the Understanding as the latter does from the Sensibility ?

4. How far does the consideration of the Sensibility enter into Transcendental Philosophy ?

How does Transcendental Æsthetic differ from Mathematics ?

5. How does Mr. Mahaffy state the problem whose different solutions form the distinctive characteristics of the schools of Kant and Mill ?

Mr. Mahaffy's statement appears to involve hypotheses which the adherents of these schools might not admit?

State the question at issue between the two schools without any hypothesis.

6. The characteristic of Space, on which its existence as a *quantum* depends, is put forward even more prominently by the Association School than it is by Kant?

The Association School makes an addition to Kant's thesis?

The existence of the characteristic alluded to above is confirmed by the observations made in Franz's case?

7. How does Bain answer the question, "What is the probable seat of a sensation or mechanical feeling when revived without the reality," and what arguments does he adduce in support of his opinion?

8. What is Bain's definition of the External World?

How far do Bain and Mansel agree as to the conditions on which a sense of externality depends, and wherein do they differ?

9. What, according to Bain, is the true meaning of the assertion that the sun exists?

Something more is commonly meant, and this additional meaning involves an absurdity?

What is the distinction between the ideal and the actual?

10. What does Bain understand by Perception as distinguished from Sensation?

How does his distinction differ from Mansel's?

How does he account for the truth of Hamilton's theory of the inverse relation between Perception and Sensation so far as it is correct?

11. How does Bain account for the fact mentioned by Butler that Anger and Self-love are each a distorting medium?

12. How does Bain account for the origin of the hypothesis of the separate existence of abstract ideas?

SUPPLEMENTAL DIVINITY EXAMINATION.

JUNIOR CLASS.

DR. LEE.

EPISTLE TO THE GALATIANS.

Translate:—

ὅτε δὲ ἦλθε Πίτρος εἰς Ἀντιόχειαν, κατὰ πρόσωπον αὐτῷ ἀντίστην, ὅτι κατεγνωσμένος ἦν· πρὸ τοῦ γὰρ ἰλθεῖν τινὰς ἀπὸ Ἰακώβου, μετὰ τῶν ἰθνηῶν συνήσθien· ὅτε δὲ ἦλθον, ὑπέστελλε καὶ ἀφώριζεν ἑαυτόν, φοβούμενος τοῦς ἐκ περιτομῆς· καὶ συνυπεκρίθησαν αὐτῷ καὶ οἱ λοιποὶ Ἰουδαῖοι, ὥστε καὶ Βαρνάβας συναπήχθη αὐτῶν τῇ ὑποκρίσει.

ἀλλήλων τὰ βάρη βαράζετε, καὶ οὕτως ἀναπληρώσατε τὸν νόμον τοῦ Χριστοῦ· εἰ γὰρ δοκεῖ εἶναι τι, μηδὲν ὢν, ἑαυτὸν φρεναπατᾷ· τὸ δὲ ἔργον ἑαυτοῦ δοκιμαζέτω ἕκαστος, καὶ τότε εἰς ἑαυτὸν μόνον τὸ καύχημα ἔξει, καὶ οὐκ εἰς τὸν ἕτερον· ἕκαστος γὰρ τὸ ἴδιον φορτίον βαστάσει.

Parse the following words, and conjugate accurately and fully the corresponding verbs:—

ἀντίστην, συνυπεκρίθησαν, κατεγνωσμένος, συναπήχθη.

Decline throughout the following words:—

τὰ βάρη, μηδέν, τινος, τῇ ὑποκρίσει, ἀλλήλων, τὸ καύχημα.

PEARSON ON THE CREED.

1. The significance of the name *Jesus* may be shown by the comparison of the history of Joshua?
2. How does Pearson comment on the references to the Messiah both before and under the Law?
3. What is his note on the reference to Messiah in Dan. ix. 26?
4. What were the five signs of the Divine Glory in the first Temple, which were wanting to the second? What prophecy of Christ is explained by this fact?
5. Prove that the *Regal* office belongs to the Messiah.
6. Give a summary of Pearson's comment on the words: "Feed the Church of God which He hath purchased with His own blood."
7. Quote accurately the text on which may be grounded "the certainty of the eternal dominion of Christ as man."
8. What doctrine may be inferred from the words, "Now the Lord is that Spirit"? and how does Pearson remove the objection urged against this inference?
9. State the steps of the reasoning which proves that the Holy Spirit is distinct from the Father and from the Son.
10. How did S. Cyril argue in reply to the statement of Theodoret as to the manner in which the Holy Spirit is related to the Son?

PROFESSOR'S LECTURES.

1. Distinguish between Rationalism and Naturalism.
2. What is the reply to Hume's objection to the argument from Design, that "the world is a singular effect"?
3. How do Pantheists seek to get rid of the idea of "Creation"?
4. What is the reply to all forms of the theory of Metempsychosis?
5. What is the utmost that can be claimed by those who urge the fact of seeming "failures" or "defects" in Nature's contrivances as an argument against the proofs of beneficent Design?

6. What is the weakness in Dr. Chalmers' illustration to explain how prayer may be efficacious without interfering with the regular course of nature?

7. What are the leading features of Positivism?

8. What facts, of which we can ourselves judge, may be adduced in proof of Revealed Religion?

9. State, and show the weakness of, the modern critical objections to the unity and authenticity of the Book of Isaiah.

10. What are the most ancient catalogues of the Books of the New Testament?

11. How does Archbishop Whately analyse and refute Hume's assertion that no testimony can prove a miracle?

12. What is the fallacy of Renan's demand that the truth of miracles should be proved by experimental verification?

13. How does the later form of Strauss' "Life of Jesus" differ from its earlier form?

14. In what respect is Dr. Arnold's theory of Prophecy defective? Illustrate this by an example.

15. Define a theological "dogma."

16. State accurately the Nestorian heresy, and its relation to the heresies of the same period.

17. Give the Scriptural refutation of Nestorianism.

18. Give the Scriptural refutation of the Monothelite heresy.

19. Write a note in criticism of Archbishop Magee's explanation of the preference given to Abel's sacrifice.

20. Give the leading texts from the Old Testament, the Gospels, and the Epistles of the New Testament which prove the doctrine of the Atonement.

COMPOSITION.

Write a Sermon on the text:—

"Ye see then how that by works a man is justified, and not by faith only."

S. James, ii. 24.

EXAMINATION FOR LICENSE IN ENGINEERING.

Trinity Term.

MECHANICS AND HYDROSTATICS.

MR. GALERAITH.

1. Find the moment of inertia of a cube round the diagonal of one of its faces—also round its own diagonal.
2. Define the centre of oscillation, and show how it may be found in the case of a circular plate oscillating round a tangent.
3. Define the centre of percussion. Find its position in the case referred to in last question; the shock on the axis if the plate be struck perpendicularly at its centre, also the initial velocity of rotation—the blow being struck by a ball moving at a rate of 20 feet per second, and weighing as many ounces as there are pounds in the plate.
4. State the equation which gives the relation between the weights, pressures, and temperatures of the air contained in a diving-bell before and after it is sunk.
5. Prove the barometric formula for the height of a mountain, assuming the relative density of mercury, as compared with air, at 0° C. to be 10517 : 1.
6. Give a construction for strains and thrusts in a roof. Find the expression for the horizontal thrust in a simple isosceles roof.
7. Give a construction for finding the force required to maintain a weight in equilibrium on an inclined plane, taking friction into account.
8. Give the expression for the ratio of the power to the resistance in a screw, friction being taken into account.
9. If two perfectly elastic balls come into collision, prove that the total work stored up in the balls is the same after and before the collision takes place.
10. If an elastic beam be bent into a shape slightly differing from its original form, prove that

$$\frac{1}{\rho} = \frac{M}{EJ}$$

in which ρ is the radius of curvature, M the bending moment, E the modulus of elasticity, and J the moment of inertia of cross section.

MR. LESLIE.

1. Describe the method by which it is determined how the elastic force of steam varies with its temperature.

2. Assuming that the total quantity of heat necessary for the evaporation of water is given by Regnault's formula,

$$Q = 606.5 + 0.305 T,$$

adapt this formula to the Fahrenheit scale, and find the latent heat of steam at 150° F.

3. The formula of the French Commissioners for the force of steam is

$$F = (1 + 0.7153 t)^3,$$

in which the force is expressed in atmospheres, and t is counted from 100° C. in units of 100 degrees: adopt this to the Fahrenheit scale, the pressure being expressed by pounds on the square inch.

4. Show how the mechanical equivalent of heat in the equation $W = JH$ can be found in terms of the specific heats of air.

5. When water is evaporated, show how to find the amount of heat expended on internal work.

6. Show how to calculate the amount of injection-water required for a condensing engine, being given the pressure in the boiler, and the temperature of the water.

7. Deduce the two fundamental equations on which the theory of the double-acting engine depends.

8. Show how to find the absolute maximum useful effect in a double-acting engine.

9. Form the general equation on which the theory of a locomotive depends.

10. Deduce the equations upon which the solution of all questions connected with the working of a single-acting engine depend.

 DR. DOWNING.

1. In an elliptical arch of masonry having a span of 76 ft. and rise of 19 ft., the depth of the key-stone at the centre being 2 ft. 6 in., and the breadth from face to face 34 ft.

Compute the horizontal thrust on the key course in tons, and per square foot; the depth of material over the key stone being taken at 2 ft., the weight of the material of the bridge being $14\frac{1}{2}$ cubic feet to a ton, and give a proof in full of the formula you employ.

2. Draw up a specification of the arch of the above dimensions.

(a). The ring pens being of aisler work, and the arch sheeting being of suitable fitted rubble.

(b). The arch being formed of brickwork with aisler ring pens, and secondly in brick-work in every part of the arch. The specification must very fully contain all that has been taught and laid before you.

(c). What additional clauses should be inserted in the case of an oblique arch being required at that site.

3. Draw a sketch of the centering to be employed in an arch of the above dimensions, pointing out the adaptation of strength to pressure in the various parts both in the elevation and transverse section which you give. Point out also the differences in the design when the headway has to be preserved or has not, in the case of the arch being over a road, or railway, or river. What precautions must be taken so that the arch when completed may have exactly the dimensions on the design.

4. Compute the total quantity of masonry in the above arch, the arch sheeting being 3 ft. 3 in. thick at the springing; that at the key, as above, being 2 ft. 6 in.; and also compute the area of the soffit of the arch.

5. Give the specification for an embankment across a valley intended to impound the water of a stream flowing through it. The surface of the ground on which the embankment rests is partially covered with shrubs and peaty soil, and has a considerable slope in the direction down stream.

6. Also give the specification for the formation of an embankment for a road or railway, contrasting it with the former, and add that for carrying on and completing an excavation in rock, gravel, or clay.

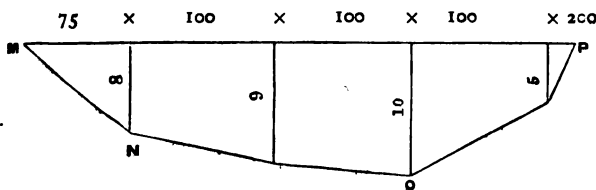
7. In embankments abutting upon masonry, or carried over arches, or culvert, give the clauses that should be inserted; also those required when the ground for the base of the embankment is not suited to bear the weight. In the case of great slips in completed embankments, what course would you pursue in order to secure the formation level?

In these questions requiring specifications of works, credit can only be given for very definite statements of those points which have been fully laid before you in the course of instruction.

8. A river 150 ft. wide and 4 ft. in depth—the sides being vertical—has a fall of 2 ft. 6 in. per mile: lower down the course the fall is 1 ft. 9 in., the width and volume being the same, what will now be the depth of the stream and its velocity?

9. Prove that Dr. Young's rule, namely this—the velocity of large rivers is equal to the square root of the product of the fall in 2800 yards multiplied into the hydraulic mean depth, the unit being the inch—coincides with that in the text-book.

10. A river 395 ft. wide and having the transverse section given below has a fall of 1 ft. 6 in. per mile. Compute the velocity and discharge. The wetted border may be taken at 410 ft.



The velocity computed by the usual formula as above being of course the mean velocity, from it deduce that at the surface and at the bottom by the common rule for surface, mean, and bottom velocities.

11. Describe and sketch the various methods of jointing cast-iron pipes, and the objects and circumstances which lead severally to their adoption in practice; and add a full specification for cast-iron pipes for conveying water.

From Day on the Formation of Railways.

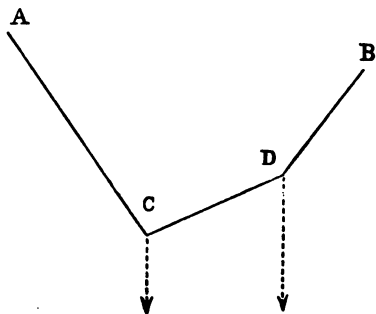
12. It is required to lay out a mineral railway with a descending traffic so that the draught on the horses may be equalized, that is, having the same resistance on the descent with coal and wagons, as on the return journey with the empty wagons. The friction is 16 lbs. per ton, or $\frac{1}{15}$ th part, and the wagons weigh 7 cwt. each = w , and carry 28 cwt. of coal = W . An output of 420 tons per diem is to be expected.

Compute the inclination = $\frac{1}{n}$ so as to effect the object, and compare the work done by the horses with this inclination, and if the line was graded to the plane of repose.

13. Also compute the inclination = $\frac{1}{m}$ if there was a return traffic of 106 tons per diem = W , W_1 , the wagons, the friction, and the output of coal being the same.

14. State some of the information given by the same author in his Chapters on Excavation and Embankment.

15. Prove geometrically, and by general symbols, all the properties of the funicular polygon or polygon of rods: and in the case of three rods or cords, a particular construction gives the ratio of the several forces, as in the woodcut. What is the difference between the polygon of rods and that formed of cords?



Apply what you have given above to the equilibration of the arch.

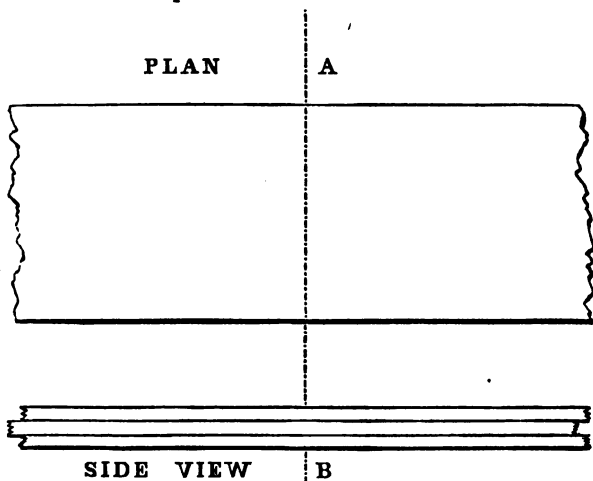
16. Describe the process of vertical shaft sinking through good clay to be lined with brickwork, and give a full specification for the work.

Describe also and sketch the method of shaft sinking through wet quicksand adopted at Saltwood by W. Simms.

17. State all that is given by Sir J. Burgoyne on the reasons pro and con, influencing the construction of one large tunnel to contain the up and down lines of railway, or two smaller parallel tunnels each having one line of way. Also give his remarks as to the most favourable direction of the bedding of the rock in tunnelling, and also that which is least favourable to progress and economy, giving an explanatory sketch. And also give a sketch of the longitudinal section showing the method of carrying on the excavation in rock, and keeping up the ventilation.

18. Describe fully from W. Simms' work, the method of getting in the shaft length in ground requiring full timbering, and the connecting of the vertical shaft with the crown; also give a specification for the brick-work in any of the lengths.

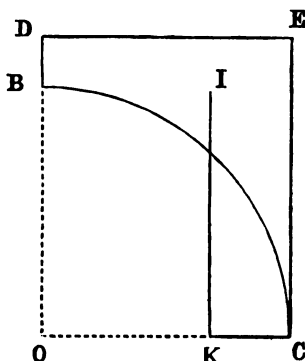
19. Design the joint of the plates forming the bottom flange of a wrought-iron girder, having double cover plates. The flange may be taken as consisting of three plates, each $\frac{7}{8}$ inch thick, combined. The joint is to be symmetrical on each side of the dotted line in the woodcut. The centre of the span is to be taken as being towards the right-hand side. Show where you would joint each several plate, both on the plan and side view, and draw the plan of the cover plate, giving the position of each rivet, thus +, the pitch to be 4 inches. Point out the relative strength of the joint you design, and that of the three combined sections of the plates.



20. Give a specification for the plates of a wrought-iron girder as they first arrive from the iron manufacturer; and secondly as to the tests of quality of material, and again as to workmanship in putting them together. As some small quantity of castings will be required,

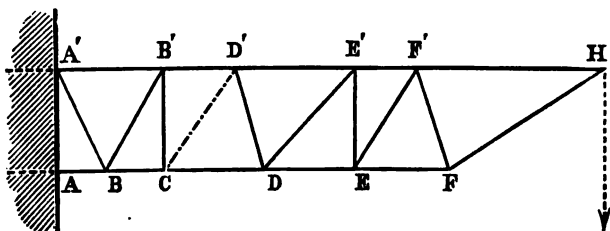
add clauses for cast-iron and also for the timber in planking, &c. Note also the circumstances in which the rivet holes are to be drilled or to be punched.

21. Many different methods of forming the top and bottom flanges of wrought-iron girders, and of the manner of connecting them with the vertical web have been taught you. Draw sketches of the transverse sections, at the centre of any two of these; noting particularly the span and load to which each may be more particularly adapted; and add the manner of properly proportioning the flanges in longitudinal section.



22. Find the centre of gravity I of the spandril space $DBCE$; computing the values of KI and KC . When $OB = OC = 50$ ft., and $KC = 8$ ft.

23. In a beam firmly fixed into a vertical abutment and loaded at the outer extremity, as represented in the woodcut, and having horizontal



upper and lower flanges connected by diagonal bracing at various angles, it is required to exhibit geometrically the magnitude of the several forces acting in different parts of the girder, arising from a single force applied vertically at the extremity H . Point out also the nature of the strain in each bar as in E_1D , B_1D_1 , as well as its amount. The bars B_1C , and E_1E , are vertical.

24. A horizontal beam of 78 ft. clear span has, at 20 feet from either abutment, a force of 8 tons acting vertically downwards. Calculate the

shearing force in tons in any vertical section on either segment of the span, and show by a diagram the nature of this strain.

If, in addition to the load as above, a force of 11 tons were placed at a distance of 27 feet from the abutment opposite to that from which the 20 ft. distance was measured in the first case, compute now the shearing force in the three several divisions of the beam, 20 feet, 31 feet, and 27 feet, respectively.

25. State a few of the chief facts in the history of artificial cements, and the cause of Mr. White's ultimate success in the manufacture of Portland cement. If no means of testing this cement were at hand, how far could you form a judgment of its quality by an immediate inspection? How would you specify for this cement, as used by architects for external plastering in house building, so as to secure good quality, no testing machine being available? Give a full specification for Portland cement to be employed on a work requiring very large quantities for a long period of time. Compare this cement with the Orchard and the Roman cements as to their several properties, and most suitable applications.

26. The action of the effective part of the half arch and its spandril filling on the abutment is twofold.

(a). Explain this, and give the expression for the thickness of the abutment of a given height derived by W. Barlow from this consideration.

(b). If the height of the abutment from the springing to the foundations was increased indefinitely, show, from the expression you give above, that the thickness does not increase in proportion, and deduce the value of the limit to which the thickness approaches, but does not exceed.

27. (c). Find the expression for the thickness of abutment when any additional load is placed on the arch, as in No. 26. Let B be the load expressed in terms of the area of the half arch and backing, and s its horizontal distance from the point of application of half arch and spandril.

(d). In like manner, when the arch and abutment are given we can find the extreme load which may be placed on the half arch.

28. Give a clear proof of the well-known formula for the thickness of a vertical retaining wall (being a rectangle in transverse section), namely—

$$\text{Thickness} = \text{Height} \times 0.578 \times \tan \frac{1}{4} (90^\circ - \theta) \times \sqrt{\frac{w}{W}}$$

In which θ is the angle of repose, and w the weight of a cubic foot of the earth, that of the masonry being W .

This expression gives mere equilibrium; if it were required to have a coefficient of stability of 2, what would the number 0.578 become?

The earth at the back is supposed level. Draw a transverse section with figured dimensions for a quay wall, the rise and fall of the spring tides being 15 feet, the depth at low water 20 feet, and thence downwards to firm ground for foundation 9 feet.

29. Describe the peculiarities of the tides at the site of the Britannia Bridge as given by E. Clark, and point out how they influenced the choice of the time for floating the tubes into place from the platform.

Give his computation for the strain upon the guiding cables from the action of the current on the immersed surface of the pontoons; this surface was found to be 400 sq. ft., and the maximum relative velocity of the current and the pontoons was 9 ft. per second: the weight of the salt water may be taken at $63\frac{1}{2}$ lbs. to the cubic foot. State clearly the principle by which you must be guided first, and then work out the result in tons.

30. An answer was given by Mr. E. Clark to those who feared the effect of lateral pressure in great gales of wind on the tubes in their exposed position, both by a special experiment on the large model at Millwall, near London, and also by observations on the completed tubes before they were floated away from the platform. State this experiment, and the law of the strength of the model in it; and also the observations made at the works.

31. Write down on the section accompanying this question all the information required by the Standing Orders to be given on deposited sections.

The left-hand side is supposed to form a junction with an existing line, and to be the zero of distance for this extension; state what are the requirements of the Orders in this particular case.

If the map of this portion of the line, consisting only of the centre line, with its curves and straight portions intersecting fields, and ground continuously built upon, were also laid before you, state the information required to be given by the Standing Orders in it. The section is at a scale of 2 chains to one inch horizontal, and 20 feet = one inch vertical.

DR. APJOHN.

1. Give the reactions of sulphuric acid on mercury, and explain the action of nascent hydrogen on the gas which is developed.

2. Iron may be converted by nitric acid into a ferrous, or a ferric salt. Give the theory of the production of each.

3. Having a supply of cyanide of potassium, how would you convert it into ferrocyanide of potassium, and this latter into the ferridcyanide of same metal. State also how the ferridcyanide could be reduced to the ferrocyanide.

4. Mention the constituents of speigeleisen, and state how you would effect its analysis.

5. Spathose iron may contain, associated with the carbonate of iron, smaller quantities of the carbonates of manganese, magnesia, and lime. What course would you take with a view to determining the precise amount of each constituent?

6. Write the formula of ammonium oxalate, and give the changes which it experiences when digested with an excess of H_2SO_4 .

7. A water was found to require, before boiling, 19 measures of the standard solution of soap; and after boiling, 11.5 measures. From these data deduce the corresponding degrees of hardness; and, assuming that the only earthy salts present were chloride of calcium, and hydrogen-

calcium carbonate, deduce the amount of each of these compounds present in an imperial gallon of the water.

8. Enumerate the groups, and the group tests at present used in qualitative analysis.

9. An alloy is composed of tin, zinc, copper, and iron: what method would you adopt with a view to its analysis?

10. What is the compound formed when water of ammonia is saturated with the sulphide of hydrogen? How is such compound converted into the sulphide of ammonium, and this latter into the bisulphide?

11. Write the formulæ of hydrofluoric acid, fluoride of silicon, and hydrofluosilicic acid; explain how each is obtained; and mention the chief uses of the latter compound in analysis.

12. Write the formula of the common phosphate of sodium, and state how by means of it you could prepare tetrabasic phosphoric acid.

13. What are the reactions which are the bases of volumetric processes for estimating iron, arsenious acid, and hydrocyanic acid; also those by which we estimate free iodine and free chlorine?

14. A mineral has been found to consist of—

Silica,	53.5
Alumina,	15.3
Barytes,	7.6
Strontites,	10.2
Water,	13.4

100.0

State how this analysis should be made, and from the above data deduce the formula of the mineral.

ECCLESIASTICAL HISTORY PRIZE EXAMINATION.

THE PROFESSOR OF ECCLESIASTICAL HISTORY.

1. By whom alone of the ancients has mention been made of Athenagoras?

2. How has Bishop Pearson shown a considerable amount of regard for this writer?

3. Why is it probable that the treatise concerning the Resurrection was composed by Athenagoras *after* he had written his Apology?—Date of the latter work?

4. When did Philippus Sideta live?—What is his testimony respecting Athenagoras? and is it credible?—In what work did H. Dodwell bring to light the remarkable fragment concerning the Alexandrine School?

5. Date of the earliest edition of Athenagoras *De Resurrectione*?—What connexion had Marsilius Ficinus with this treatise?—and why did that reviver of the Platonic Philosophy take a special interest in it?

6. State the argument, founded on what is called the Plastic, or Vegetative, Nature of things, employed by Athenagoras to prove the Resurrection.

7. In what ways was the work of Ratramnus connected with both the Mediæval, and the Reformed, Church of England?

8. The name and profession of the editor of the best edition of Ratramn's book, in Latin and English, (Lond. 1688,) are intimated by some of the following capital letters, which occur at the end of his Dedicatory Epistle:—"L. M. Q. D. D. D. C. Q. VV. H. S. A. E. P. R."—?

9. How may the corrupt name "Bertram" be accounted for, in Claude's opinion?

10. The unfairness of a French translation of Ratramn's treatise has been very strongly censured?

11. State precisely what was the doctrine of Ratramnus, with regard to the Real Presence in the Eucharist.

12. Where, and when, was the celebrated work by Ratramnus first published?

13. How were the Oxford translators and editors of this tract (Parker, 1838,) much mistaken in saying, that it "stands in the Index of Prohibited Books, made by the Council of Trent, A. D. 1559?"

14. Dates assigned to the composition of the Athanasian Creed by Waterland and other writers?

15. An important reading in a verse of the *Te Deum* is found in the Utrecht MS. ?—Any other evidence with regard to this point?

16. Character of the Reports, addressed to the Trustees of the British Museum, relative to the age of this MS. ?—and the safest opinion upon that subject?

17. How is Archbishop Ussher connected with this controversy?

18. At what time was the Gallican Church brought under the yoke of Arianism?

19. When were Stone Altars first erected?

20. Quote the memorable words of S. Ambrose, with respect to S. Helena, and the three Crosses which she is said to have found.

21. Pelagianism is reducible to two principles?—Which of them was the original element of the system?

22. How did Theodore of Mopsuestia anticipate the Rationalism of modern times?

23. State the case of Apiarius, early in the fifth century; and mention particulars as to the famous Canon respecting Appeals to Rome.

24. What ancient document was called *The Tome*?—Of what subject does it treat? and how?

25. The spurious Donation of Constantine produced an injurious effect on the Waldenses?

26. Dr. Melia has made a most strange omission in his enumeration of books on Waldensian History?

27. What is said to have been the first national cause, round which the people of Ireland ever rallied?

28. How much of this country was included in "The Pale?"

29. What part of it was called "The Border Land?"

30. The Vote of the Irish House of Commons, in the eighteenth century, against the Tithe of Agistment, involved a double persecution of Protestants?

[The remainder of the Examination was conducted *vivâ voce*.]

EXAMINATION FOR SANSKRIT PRIZE.

DR. ATKINSON.

Translate into English :—

akathayam ca ṣṛigâlikâṃ bhaṇa bhadre kathambhûtaḥ kanyâpurasaṃni-
veso mahânayam prayâso mâ vṛithâ bhût — amutra kimciccorayitvâ
nivartishya iti tadupadarṣitavibhâgascâvagâhya kanyântahpuram pra-
jvalatsu ma idîpeshu naikakrîḍâkhedasuptasya parijanasya madhye ma-
hârharatnapratyuptasimhâkêradantapâde hamsatûlagarbhakomalasaṃyo-
padhânasâlini kusumalavacchuritaparyante paryamkatala dakshinapâda-
pârshnyadhobhâgânuvellitetaracaranâgrapṛishṭhamîshadvivṛitamadhura-
gulphasandhiparasparaśiṣṭajamghâkâṃdamâkumcitobhayajânu kimcid-
vellitorudamdayugalamadhinitambasrastamuktaikabhujalatâgrapeśalama-
pâsrayântanihitâkumcitetarabhujalatottânatalakara viśalayamâbhugnaśr-
onimamḍalamatisliṣṭacîṇâṃsukântarîyamanativalîtatanutarodaramanû-
taranîṣṭvâśârambhakampamânakathorakucakudmalamâtirasçîṇabandhur-
asîroddesaḍṛiṣyamânanishṭaptatapanîyasûtraparyastapadmarâgarûcaka-
mardhalakshyâdharakarnapâsanibhṛitakumḍalamupariparâvṛittasravaṇa-
pâsaratnakarṇikâkirapam maṃjarîpimjaritaviśhamavyâviddhaṣiṭhilaṣik-

handhabandhamâtmaprabhâpataladurlakshyapâtalottarâdharavivaram gam-
 mdaasthalisamkrântahastapallavadarsitakarnâvatamsakṛityamuparikapo-
 ladeesatalanishaktacitravitânâpatrajâtijanitavisheshakakriyamâmîlitalocan-
 endivaramavibhrântabhrûpatâkamudbhidyamânasramajalapulakabhinna-
 sithilacandanatilakamânanendusammukhâlakalatam ca viṣrabdhaprasup-
 tâmatidhavalottaracchadanimagnâm prâyaikapârṣvatayâ ciravilasanakh-
 edaniṣcalâm śaradambhodarotsamgasayinîmiva saudâminîm rājakanyâm
 apasyâm dṛiṣṭvaiva sphuradanamgarâgascakitascorayitavyaniḥsprihas-
 tayaiva tâvaccoryamânahridayaḥ kimkartavyatâtmûdhaḥ kṣaṇam atish-
 tham.

1. Give the rules for the change of the final consonant in nominal bases ending in s, sh, chh, ksh, h.

2. When does the dh of 2 pl. Atm. become dh ?

3. What are the rules referring to the following :—

vach + mi = vachmi; dadh + tas = dhattas; yunj + dhi = [?]

dvesh + si = [?]; dvish + su = [?]; dvish + dhvam = [?];

prachh + tâ = [?]; prachh + su = [?]; chaksh + dhve = [?];

(β) Show generally the changes produced by an s- termination in nominal and verbal [general and special] bases.

4. Inflect

(a) adas (m. f. n.), tri, chatur, shaash;

(b) hâhâ, akshi, sakhi, senânî, nṛitû, go, śvan, pathin.

5. What is the comparative of

kshudra, guru, dîrgha, priya, dûra, yuvan, sthûla, hraswa.

6 Write out the tens (20-90); 93, 96, 83, 99, 101, 86;

(β) The numerals for 103 and 300, 104 and 400 are the same, how do you avoid this?

(c) For all the tens, hundreds, &c., less one (19, 29, &c.), there are four forms?

7. What is the Benedictive Parasmaipada of

smṛi, ṛi, strî, pṛî, jan, i, tan, ghu verbs, &c., vach, samprasâraṇas.

(β) Give the intensive of the same.

8. What is the aorist in the 3rd persons of

(a) mṛij, as, arbh, krît, sthâ, ghrâ, pâ?

(b) tan verbs, svi, hve, sās, ri, dhe, dṛiṣ, naṣ, as.

(When there are several forms, give all.)

9. Give the pp. and tvā grnd. of

sī, srams, grah, vad, vas, prachh, div, av, gai, naṣ, majj.

(β) What roots take pp. in na?

10. Classify, as far as you can, the samprasāraṇa verbs, showing the cases in which the short forms are used.

11. Write an article on the various forms of reduplication (liṭ, hu, yañ, san, &c.).

12. What are the verbs to which the rule syasichsīyuttāsishvityādi applies?

(β) State clearly the rule, and give an example of all the tenses.

13. What is the intensive of

trī, bhid, vid, hve, smṛi, prī, kṛī, dā?

(β) What roots insert nī before the radical syllable?

14. State distinctly the special rules for the reduplication of desiderative verbs.

(b) This peculiar reduplication of roots beginning with a vowel is found also in the causal?

(c) What is the desiderative of

bhū, bhid, svap, rud, ji, trī, gam, han, grah, prachh, mā, labh,

āp, much?

15. What is the causal of

i (three forms), dhū, pā, vā, sad, hve, han, sidh?

(b) Give the aorist and perfect of the same verbs.

UNDERGRADUATE HONOR EXAMINATION PAPERS.

Trinity Term.

SENIOR SOPHISTERS.

Ethics.

BUTLER'S ANALOGY.

DR. STUBBS.

1. What gives the most sensible representation to the mind of a future state of punishment?
2. Give a sketch of Butler's argument to prove that a moral government is already established in the world.
3. What objection does Butler cite as showing that the notions of justice and injustice remain even when we make suppositions destructive of them?
4. What proofs of the obligations of religion does Butler specify, which are not affected by the opinion of necessity?
5. Examine the validity of Butler's argument in the well-known passage, "There is a presumption of millions to one against the story of Cæsar, or any other man."
6. How does he state the positive argument brought against the truth of religion from its difficulties? and what is the reply to this argument?
7. There is no presumption that death will be the destruction of living agents either from the near relation we have to our bodies, or from the fact that they are made up of organs and instruments of sensation and motion.
8. How does Butler reply to the objection that his arguments would equally apply to brutes.

DR. TABLETON.

1. What are the characteristics of actions as distinguished from events, and as approved of or disapproved of by the Moral Faculty?

2. There are two ways, according to Butler, in which the subject of morals may be treated.

How would the conclusion be expressed in each method of moral enquiry.

Before proceeding further with either method, a question must be answered which in the first method involves great difficulties.

How is the corresponding question answered by Butler in the second method?

3. What is the weak point as regards practice of those systems which base moral obligations on a desire to promote our own happiness, and do not take into consideration the authority of conscience?

How does Butler show that the case is altered by the admission of the authority of conscience?

4. Whence does the appearance of benevolence proceed, according to Hobbes?

How does Butler show that Hobbes' mode of accounting for the appearance of benevolence is unsatisfactory?

5. In what manner may it be maintained that it does not follow from the existence of the public affections and the Moral Faculty, that to act according to nature must lead to virtue.

How does Butler meet this argument?

6. Human nature being otherwise, such as it is, deliberate resentment is necessary in order that the affairs of the world should be properly carried on.

This inference deduced from the nature of man is confirmed by experience.

How far are the precepts to forgive and love our enemies opposed to the principle of resentment?

MACKINTOSH AND ARISTOTLE.

DR. SHAW.

1. State the first and most inveterate of Hobbes's ethical errors, and exemplify its consequences by his definitions of honour, pity, laughter, love, charity, and moral good.

2. Give Mackintosh's summary of Clarke's moral doctrines and your own summary of Mackintosh's criticisms thereon. In the latter include the author's explanation of the abusive extension of the term reason to the moral faculty, and the substitute he proposes for the term "self-love."

3. Points of resemblance between Leibnitz and Shaftesbury as moralists?

4. Give Mackintosh's account of the ethical discoveries of Butler, the deficiencies he detects in Butler's system, and his completion of Butler's theory of conscience.

5. Mackintosh points out three blemishes of unequal importance, and as many signal merits in the ethical writings of Hume.
6. Enumerate the defects of Smith's moral system.
7. What are the four most important constituents, according to Mackintosh, in the formation of the moral sentiment.
8. According to Mackintosh, one important ethical topic has been much neglected by the school of Bentham.
9. Aristotle epigrammatically contrasts the virtues with the arts and the sensible perceptions as regards the relation of knowledge to practice.
10. On two distinct grounds Aristotle condemns casuistry as a useless science.
11. Distinguish moral choice from Desire, and from Opinion.
12. A man's liberality is measured more properly by the way he spends his money than by the way he acquires it. Why so?

Modern Literature.

ENGLISH LITERATURE.

PROFESSOR DOWDEN.

1. Give some account of the laws and customs of the Empire of Lilliput, and of the manner of educating Lilliputian children.
2. (a). Johnson notices "two memorable corrections" in editions subsequent to the first of Pope's "Essay on Man."
 (b). "Pope had, in proportions very nicely adjusted to each other, all the qualities that constitute genius."—*Johnson*.
 (c). What notes are made by Johnson upon the Epitaphs of Pope on Mrs. Corbet, Rowe, Newton, Gay?
 (d). What is Johnson's estimate of Pope as an editor of Shakspeare?
3. (a). What is Johnson's criticism on Addison's simile of the Angel?
 (b). Write a notice of the relations of Addison with Steele.
 (c). What is Johnson's criticism of Addison's prose style?
4. Relate, in Addison's manner, Sir Roger de Coverley's visit to Westminster Abbey.
5. Sir Roger goes with the Spectator and Captain Sentry to a Play called *The Distressed Mother*. Give an account of this incident.

MR. PALMER.

1. Write a short account of the lives of Pope and Dryden, arranging their chief poems in chronological order.

2. Who are intended by the Tyrians, Barzillai, Ishbosheth, Agag, in "Absalom and Achitophel"? Write out in full the characters of Zimri and Achitophel.

3. Give a brief analysis of "Religio Laici."

4. Draw up a short scheme of Pope's design in the several epistles composing the "Essay on Man."

5. Give a short account of Bolingbroke. Can you quote Johnson's remark about his "Essays?"

6. The unfavourable estimate of Pope's character taken by Macaulay does not agree with the opinion that one would derive from Swift's poem on his own death?

7. What was the origin of the composition of the "Rape of the Lock?" How did its first sketch differ from subsequent additions? The "Rape of the Lock" was translated into French?

8. State where the following lines occur, and give the context:—

a. 'Tis sure the hardest science to forget.

b. In him alone 'twas natural to please.

c. — the ruling passion strong in death.

d. Never was patriot yet but was a fool.

e. Hope springs eternal in the human breast.

f. An honest man's the noblest work of God.

g. Self-defence is nature's eldest law.

9. What are the two ruling passions of the minds of women, according to Pope?

10. Write out Pope's lines describing the characters of the Duke of Wharton and Secretary Craggs.

ENGLISH COMPOSITION.

PROFESSOR DOWDEN.

1. Addison as a humourist compared with some other English writer.

2. Milton—Dryden—Pope; considered as representatives of three epochs of English poetry.

3. How the growth of the Novel has influenced poetry.

4. The respective provinces of Poetry, Painting, and Music as exponents of human thought and emotion.

[Choose one subject.]

GERMAN.

MR. BARLOW.

1. Give Heine's translation of any of the following passages from Byron:—

- (a.) "Adieu, adieu! my native shore
Fades o'er the waters blue;
The night-winds sigh, the breakers roar,
And shrieks the wild sea-mew.
Yon sun that sets upon the sea
We follow in his flight;
Farewell awhile to him and thee,
My native Land—Good Night!"
- (b.) "What Exile from himself can flee?
To zones though more and more remote,
Still, still pursues, where-e'er I be,
The blight of life—the demon Thought."
- (c.) "Mont Blanc is the monarch of mountains;
They crown'd him long ago
On a throne of rocks, in a robe of clouds,
With a diadem of snow.
Around his waist are forests braced,
The Avalanche in his hand;
But e'er it fall, that thundering ball
Must pause for my command."

2. From what poems are the following passages taken? Write explanatory notes wherever the meaning is obscure:—

- (a.) "Dieses Schwanken und Schweben und Schaukeln
Ist unertraglich!
Vergebens späht mein Auge und sucht
Die deutsche Küste. Doch, ach! nur Wasser,
Und abermals Wasser, bewegtes Wasser!"
- (b.) "Alt Heidelberg, du feine,
Du Stadt an Ehren reich,
Am Neckar und am Rheine
Kein' andre kommt Dir gleich."
- (c.) "Aber zur rechten Zeit noch
Ergriff mich beim Fuss der Kapitän,
Und zog mich vom Schiffstrand,
Und rief, ärgerlich lachend:
'Doctor, sind Sie des Teufels?'"
- (d.) "Sind ja eiskalt deine Hände!
Flüstert Clara, schauerzuckend.
'Sprachest ja, ich sollte kommen!
Und sie treiben fort im Strudel.'"
- (e.) "So will ich liegen und horchen still,
Wie eine Schildwach, im Grabe,
Bis einst ich höre Kanonengebrüll
Und wiehernder Rosse Getrabe."

3. Translate the following passages:—

(a.) "Durch die Büsche trat jung Werner,
 Frischen Trunk sich dort zu schöpfen,
 Züh verwachsen war das Strauchwerk,
 Und er trat mit festem Fuss auf:
 Da schlug an sein Ohr ein quickend
 Schriller Klaglaut, wie von einem
 Maulwurf, der bei unterird'schem
 Wühlen in der Schling gefangen
 Jäh zum Tageslicht aufgeschnellt wird.
 Knisternd hob sich's aus dem Grase.
 Vor ihm stand ein graues Männlein,
 Kaum drei Schuh hoch, etwas bucklig,
 Aber zart von Antlitz, seine
 Klugen Aeuglein blitzten seltsam."

(b.) "Wie die Wellenschaumgeborene
 Strahlt mein Lieb in Schönheitsglanz,
 Denn sie ist das auserkorene
 Bräutchen eines fremden Manns.

Herz, mein Herz, du vielgeduldiges,
 Grolle nicht ob dem Verrath;
 Trag es, trag es, und entschuldig es
 Was die holde Thörin that."

(c.) "Da der König die Genehmigung zur Zerstörung von Trier verweigerte, so äusserte Louvois einige Tage später gegen ihn: da ihn nur Gewissensbedenken von der Beistimmung zu einer für sein Interesse so nothwendigen Massregel zurückgehalten hätten, so glaube er, ihm einen wesentlichen Dienst zu leisten, wenn er die Sache auf sich nehme, und er habe deshalb einen Courier mit dem Befehl abgehen lassen, Trier sogleich zu verbrennen. Der König gerieth aber in einen so heftigen Zorn, dass er mit der Feuerzange auf Louvois losging, die Maintenon, zwischen Beide tretend, nahm ihm die Zange aus der Hand, und er befahl dem Minister, sogleich einen Courier mit Gegenbefehl abzuschicken, indem er mit seinem Kopfe dafür einstehen müsse, wenn man ein einziges Haus verbrenne. Der erste Courier war indess noch nicht abgegangen, und Trier wurde nur durch starke Brandschatzungen ausgesogen."

4. Write, in German, an epitome of the sixth section of "Der Trompeter von Säckingen"—"Wie jung Werner beim Freiherrn Trompeter ward."

FRENCH.

DR. ATKINSON.

1. Translate into English—

(a) J'ay vu quelqu'un courre la mort à force.

(b) Elle se rendra de bien meilleure composition à qui luy fera teste.

(c) Le pourceau de Pyrrho est bien de nostre escot: [Why?]

- (d) Ferons nous accroire à nostre peau que les coups d'estriviére la chastouillent ?
- (e) Pour faire un corps bien espagnolé, quelle gehenne ne souffrent elles, guindées et cenglées, à tout de grosses coches sur les costez iusques à la chaire vifve ?
- (f) Les fortuites nous trahiront au bon du faict.
- (g) Dionysius le fils eut bonne grace.
- (h) Mais tout cecy se peult rapporter à l'estroicte cousture de l'esprit et du corps s'entrecommuniquants leurs fortunes.
- (i) Le peuple le saboule vers les plus apparents de l'assemblée.
- (j) L'inconstance du bransle divers de la fortune faict qu'elle nous doive presenter toute espece de visages.
2. Write in the style of Montaigne, using as much of his phraseology as you can, an "essai" on pedantry.
3. Compose sentences (or quote passages) showing Montaigne's usage of the words : *bisia*, *escient*, *abandon*, *autour*, *heur*, *chevance*, *pieça*, *sortable*, *quand et*, *foison*.
4. Exhibit the chief peculiarities in M.'s grammatical structure, giving lists as full as you can (a) of any forms of spelling, inflection, construction, *nversion*, &c., differing from those now in use; (b) of the adjectives ending in *-able*, and their idiomatic use; (c) of adverbs now unused.
5. What are the principal patois in France? Classify them according to their most definite characteristics.
- (b) Patois often preserve words and phrases that have been lost in the written language ?
6. Write an article on the *mise en scène* of a theatre in the middle ages.
7. Show, at some length, how the possession of two cases operated for the development of the *langue d'oïl*.
8. Write (in French) an answer to the following question : " Comment le roman des Gaules a-t-il gardé cette empreinte profonde de la latinité, tandis qu'elle s'effaçait dans l'Italie et dans l'Espagne ? "
9. Write an extended article (in French), embodying all you can of Ste. Beuve's Introduction to Crépet, vol. i.
10. Give as full an account as possible of the literature of France in the 13th and preceding centuries.

Translate into English—

Povre ostel ot la dame, quant vint à l'anuitier :
 N'i ot maison, ne sale, ne chambre, ne solier,
 Ne coute, ne coissin, lincuel ne oreillier,
 Ne dame, ne pucèle, serjant ne escuier,
 Ne tapis estendus pour son cors aaisier.
 Dame-Dieu réclama, le père droiturier.
 Un moncelet a fait de feuilles d'olivier ;
 Car iluec se cuida un petitet clingier.

Mais se Jhesus n'empense, qui tout a à baillier,
 Ele aura jà moult tost merveilleux destourbier
 Car deux larron venoient de marchéans guetier ;
 Ils regardent, si voyent le bliant blanchioier.
 Li uns d'eus saut avant, si le courut sachier.
 La roïne saut sus ; si prent à fremier,
 Cuida que ce fust beste qui la vousist mengier.
 Quant cil la vit si gente, si la court embracier,
 Et l'autres li escrie : " Lais l'ester, pautonnier,
 " Elle sera ma mie, par le cor saint Richier."
 — " Voire, sire ! quar vous la féistes forgier !
 Se plus en parliez, vous le comperrez chier."
 Cil oï la menace ; le sens cuide changier.
 Un grant coutel a trait, el cor li va lancier,
 Et cil sache s'espée, tel cop li va paier,
 Qu'ambedui s'entr'abatent, tout saignant en l'erbier.
 Et la roïne Berte s'est tost mise au frappier,
 Et pour plus tôt fuir se prist à se courcier.
 Tant a fouy la lasse par un estroit sentier,
 Que l'alaine lui faut, el bois se va fichier :
 Sous une espine espesse s'est alée mucier ;
 Jusqu'à tant que noir fist, ne s'osa redrecier.
 Quant la nuit fu venue, si prist à lermoier.

1. Give the derivation of the following words, and state clearly the rules observed : cacher, cailler, cuiller, gercer, geôle, valet, orfraie, poussière, tordre, chaîne, boyau, sucer, coussin, huis ;—quarry, varlet, ewer.

2. Trace the progress of change of Latin c, g, and q, into French.

3. Write an article on the phonetic of the vowels in French, comparing with Italian and Spanish.

4. State what you think to be the views of M. Brachet as to the particular nature of that Latin language from which French is derived, and discuss their correctness.

Translate into French—

You are now perfectly well acquainted with the romantic story of Mademoiselle and of Monsieur de Lauzun. It is exactly a story, a proper story for a tragedy, in the rules of the theatre ; we laid out the acts and scenes the other day. We only took four days instead of four and twenty hours, and the piece was complete. Never was such a change seen in so short a time, never was there known so general an emotion. You certainly never received so extraordinary a piece of news before. M. de Lauzun behaved admirably well ; he supported his misfortune with such courage and intrepidity, and at the same time shewed so deep a sorrow, mixed with such profound respect, that have made him the admiration of every body. His loss is doubtless invaluable, but then the King's favour, which he has by this means preserved, is likewise invaluable ; so that upon the whole, his condition does not seem

so very deplorable. Mademoiselle has behaved extremely well on her side. She has cried very heartily ; but yesterday, for the first time, she returned to pay her duty at the Louvre, after having received the visits of every one there ; so now the affair is all over. Adieu.

Natural Science.

GEOLOGY.

DR. HAUGHTON.

1. Explain the following terms, and give examples of their use :—
 Porphyritic.
 Amygdaloidal.
 Scoriaceous.
2. Describe the following rocks :—
 Graplin Granite.
 Serpentine of the Lizard.
 Hypersthene Syenite of Skye.
3. State the arguments in favour of a former greatly extended system of glaciers in Switzerland.
4. Describe the basin of the river Amazons, and its peculiarities as to floods.
5. Describe briefly the osteological peculiarities of the Dinosaurs.
6. Describe the following genera :—
 Bellerophon.
 Pleurotomaria.
 Macrocheilus.
 Producta.
7. Describe the *Dromatherium sylvestre*, and state its nearest living analogue.
8. Describe the skull of the *Dinotherium giganteum*, and state the zoological affinities of this animal.
9. Name any fossil Edentate found in Europe.
10. Draw a sketch of the tooth of *Iguanodon Mantelli*.

ZOOLOGY.

DR. MACALISTER.

1. What are the characters of the swimming bladder in the Haddock, Trout, Lepidosiren, and Johnius ?
 . What fishes have no swimming bladder ?

3. How is the anterior end of the swimming bladder modified in Cyprinoids?
4. How are the gills arranged in pipe-fishes?
5. Describe the arrangement of the pharyngeal bones of the Wrasse.
6. How does the digestive canal of an Owl differ from that of an Eagle?
7. Describe the palato-quadrate bones of the skull of a Parrot.
8. What is the dentition of the Dog?
9. How does the Emu differ from the Ostrich in the structure of its shoulder-girdle?
10. Describe the development of the placenta in the Cat.

BOTANY.

DR. E. PERCEVAL WRIGHT.

1. Give a diagnosis of the order Nymphaeaceæ.
2. Give a list of as many genera as occur to you of Papaveraceæ.
3. Describe the fructification in Selaginella.
4. Enumerate some of the chief forms of reproduction met with among the green-coloured Algæ.
5. State what you know about the Secretory System of Plants.
6. What are the chief causes producing the ascent of the sap?
7. Do the green parts of the higher plants absorb moisture?
8. State what you know as to the peculiarities of the Saint Vallery apple.
9. Give some examples of the cohesion of foliar organs.

Modern History and Political Economy.

MODERN HISTORY.

PROFESSOR BARLOW.

1. Give Châlcocondylas' description of Germany, France, and Britain. What is Gibbon's inference from this account?
2. Give an account of the battle of Warna, A. D. 1444. It is said that Amurath invoked "the prophet Jesus himself" against the Christians; explain this.
3. Describe the final assault on Constantinople, 1453.
4. "The private story of the rival Houses of Colonna and Ursini is an essential part of the annals of modern Rome."

5. Gibbon, speaking of Rienzi, observes that "the same enthusiasm, in the next century, conducted his imitator to the gallows." To what does he refer?

6. What were the four principal causes of the ruin of the city of Rome? Which of these is considered by Gibbon to have been the most potent and forcible cause of destruction, and for what reasons?

7. Write a short history of the events which took place in Poland on the death of Augustus II. (1733).

8. Give some account of Frederick William I. of Prussia.

9. Relate the history of the Convention of Kloster-Seven. What battles were fought by Frederick in the same year?

10. Who was the Marquis of Pombal?

11. Write a short history of the reign of the Emperor Joseph II.

12. On the twenty-eighth of February, 1780, the Russian minister, Count Panin, forwarded to the Courts of London, Versailles, Madrid, Stockholm, and Copenhagen, a Declaration announcing four important principles of Maritime Law. What were these, and what were the causes of this measure?

PROFESSOR DOWDEN.

1. Give an account of the fourth Crusade from its origin to the first siege and conquest of Constantinople by the Latins.

2. Who were (a) The Volunteers (*Θεληματαριοι*).
 (b) The August Triad.
 (c) The Great Company?

Relate the most important achievements of "the Great Company."

3. Write notices of (a) Villehardouin.
 (b) John of Procida.

4. Give an account of the first passage of the Turks into Europe (1341-47), and their establishment in Europe under Orchan.

5. "As Gregory VII. appears the most usurping of mankind till we read the history of Innocent III., so Innocent III. is thrown into shade by the superior audacity of Boniface VIII." Adduce facts to illustrate this statement of Mr. Hallam.

6. (a). What were the "False Decretals"? Their purport?
 (b). What were the provisions of the Pragmatic Sanction of St. Louis?
 (c). What was the Concordat of Aschaffenburg?

7. Give an account of the origin of the Great Schism, and of the proceedings at the Councils (a) of Pisa, (b) Constance, and (c) Basle (1433)?

8. Write a notice of the checks on Papal authority in France. The liberties of the Gallican Church, Mr. Hallam says, depended on two maxims?

POLITICAL ECONOMY.

PROFESSOR DONNELL.

1. What are the principal and occasional elements in Cost of Production ?
2. Distinguish between the Amount of Wages and the Price of Labour.
3. Why are the wages of women lower than those of men ?
4. Can the general rate of wages be diminished by the introduction of machinery ?
5. State the advantages of Capital.
6. What is meant by the Minimum of Profits ? How is it varied ?
7. What are the economic consequences of the monopoly of land ?
8. How does the existence of slavery in a country affect the values of commodities produced therein ?
9. In what cases has an increase of currency no tendency to raise prices ?
10. Sketch the economical progress of Europe after the fall of the Roman Empire.

JUNIOR SOPHISTERS.

Experimental Physics.

MR. LESLIE.

1. Describe the different electrical machines which depend on induction, and explain the principle of their action.
2. Describe the various kinds of electrometers, and explain the mode of using them to find the amount and the kind of electricity with which a conductor is charged.
3. Give the theory of a *Leyden jar*, and show (a) how to give a jar a definite charge; (b) how to determine the amount of charge in a jar already charged.
4. State the various experiments by which the calorific and chemical effects of frictional electricity may be shown.
5. How may it be shown that the duration of the electrical discharge is very short; and how has it been attempted to measure this interval of time ?
6. What is the chief cause of the enfeeblement of the current in voltaic batteries, and by what experiments may it be illustrated ?
7. Describe an electric lamp, and state the precautions to be observed in the preparation of the battery. What experiments may be made with it ?

9. What are the laws of the ascent and depression in capillary tubes, and what is the cause of the phenomena?

10. What are the phenomena termed calorescence and fluorescence, and how are they observed?

Metaphysics.

DR. STUBBS.

1. Sir W. Hamilton proves the law by which the phenomena of cognition and feeling are governed in their reciprocal relation; (1) from a comparison of the several Senses; (2) from the several impressions of the same Sense.

2. Hamilton shows that the hypothesis of a Representative Perception violates all the conditions of a legitimate hypothesis.

3. How do intuitive and representative cognitions differ in relation to their objects.

4. How does Hamilton illustrate the law that the conceivable lies between two contradictory extremes, by a reference to Space and Time.

5. What is Sir W. Hamilton's classification of the opinions on the nature and origin of the principle of Causality?

6. How does he deduce the phenomenon of Causality from the Law of the Conditioned? For what three reasons is this doctrine of Causality to be preferred?

DR. TARLETON.

1. On what grounds does Mill maintain that Kant is open to the charge of denying some part of the testimony of Consciousness, and invalidating thereby the appeals which he nevertheless makes to Consciousness as a voucher for his own doctrines.

This criticism is incorrect, and the attack on Kant cannot be maintained with consistency by one who holds Mill's opinions.

What is really the difference between Mill and Kant in reference to the cognition of external objects?

2. If all sentient beings were annihilated would it on Mill's principles be just the same whether the material universe were annihilated or not? If not the same is it not incorrect to say that nothing exists except mind and its modifications possible and actual? If the same, suppose the material universe annihilated, and sentient beings called again into existence, and will it not follow that it would make no difference if we lived in empty space?

Examine the different points in this argument, and refute it if unsound?

3. Show that Mill could not consistently maintain, though Hamilton could, that our knowledge of mind is relative in the same sense and to the same degree as our knowledge of matter, unless he abandon altogether the doctrine of the relativity of knowledge in the true meaning of relativity.

4. It is well-known that if a magnet be made to rotate in front of a metal disk the induced electricity offers a Resistance to the motion. Can we from thence conclude that electricity is Matter?

In what sense must Resistance be understood when it is asserted to be the most fundamental property of Matter, and in what sense is it the most fundamental?

If it be regarded as essential to Matter at all, we can see by mere analysis that it must be the most fundamental of the essential primary qualities mentioned by Mill.

5. How does Kant show that *a priori* principles are essential to experience?

Kant mentions two circumstances which induce people to rely without criticism on results obtained *a priori*.

6. In what difficulty are those philosophers involved who hold the absolute reality of Space and Time, and what are the difficulties of those who regard Space and Time as relations of phenomena abstracted from experience.

7. On what grounds does Mr. Mahaffy maintain that a science of morality cannot be deduced from the datum of personality.

8. How do Mr. Mahaffy and Mr. Bain respectively explain the origin of our notion of velocity, and what are Mr. Mahaffy's objections to Mr. Bain's explanation?

SCHWEGLER.

DR. SHAW.

1. State and comment on the distinction drawn by Schwegler between philosophy and the sciences which he calls "empirical"—e.g. astronomy.

2. Hegel's dictum asserting the essential identity of the succession of philosophical systems with the succession of the logical categories?

3. Schwegler sums up in three propositions the contributions of the Hylicist school to philosophy?

4. Mention some modern scientific discoveries which if they had been known to the contemporaries of Pythagoras, would have given great plausibility to his fundamental doctrine.

5. Give examples of the method of Zeno (the Eleatic) in eliminating the non be *êut*.

6. The Megaric group of Plato's dialogues exhibits a progressive development of the Ideal theory?

7. Schwegler's exposition of the Platonic dialectic consists of six parts. State the question proposed by each, and briefly indicate the conclusions arrived at.

8. In his positive exposition of the Ideal theory (of Plato) Schwegler contrasts the subjective and the objective reference of Ideas.

9. State (*a*) the four Platonic antinomies respecting the One and the Many; and (*b*) the conclusion drawn by Schwegler, from the consideration of them, as to the purpose of the *Parmenides*.

10. In contrast with the method of Plato, Schwegler calls that of Aristotle analytic and regressive. Expound Schwegler's meaning.

11. Schwegler gives five distinct proofs that Aristotle did not clearly recognise the now accepted distinction between logic and metaphysic?

12. The correlation of Thought and Matter, on Aristotle's system, appears from the definitions he gives of them?

13. From what premises does Aristotle deduce the predicates (i. e. the essential qualities) of the Supreme Being.

14. State fully the theory of cognition which gives to Neo-Platonism its peculiar character.

15. Give a brief account of the pantheism of Giordano Bruno.

Classics.

GREEK ORATORS.

MR. POOLE.

Translate the following passages into English Prose :—

1. *Beginning*, Οἶμαι τοίνυν αὐτὸν οὐδὲ τοῦ δήμου, κ. τ. λ.
Ending, φθόνον ἐξ ὧν ζῆς, καὶ ἐφ' οἷς ἐξαπατᾷς ἔλεον.

DEMOSTHENES.

2. *Beginning*, Ἴνα δὲ καὶ περὶ ἐκείνου εἴπω τοῦ νόμου, κ. τ. λ.
Ending, μέλλει πρὸς ὑμᾶς λέγειν.

Ibid.

3. *Beginning*, Λακεδαιμόνιοι μὲν καὶ τὸ ξενικὸν ἐπίτυχον μάχη, κ. τ. λ.
Ending, καὶ σαυτὸν ἐπὶ τὸ γεγεννημένον ἐπιγράψεις;

ÆSCHINES.

4. *Beginning*, Αἴτιον δ' ἦν τοῦ ταῦτα τοῖς πολλοῖς ἀρίσκειν, κ. τ. λ.
Ending, ἐπιμελεῖσθαι τῶν κοινῶν, ὥσπερ οἰκειοτάτων.

ISOCRATES.

1. What were the circumstances which so embittered the Athenian populace against Phocion; and what is Grote's view of his character and policy?

2. How does Grote show that Æschines cannot be trusted as an accuser of Demosthenes?

3. Give some account of the remarkable successes of Persia shortly before the expedition of Alexander, and of Mentor's share in them?

4. What was Æschines' defence for his being the means of causing Philip's interference in the Amphictyonic War?

5. What process noticed by Æschines existed for the simplification of the Athenian Laws?

6. Translate and write notes on the following passages:—

a. διώμνυτο τὴν Ἀθηνᾶν, ἣν, ὡς εἰοικε, Φειδίας ἐνεργολαβεῖν εἰργάσατο καὶ ἐπιιορκεῖν Δημοσθένει.

b. ἡ αὐτὴ αὖτις τοίνυν εἰδὼς Αἰσχίνης οὐδὲν ἤττον ἐμοῦ κομπεῦειν ἀντὶ τοῦ κατηγορεῖν εἴλετο.

c. τοῦ δὲ προβαλομένου πεισθέντος, τὴν δίκην τε πᾶσαν ἀφεῖναι ἠναγκάσατε αὐτὸν ἣν ὑρήκει πρότερον.

7. Write notes, where required, on the passage from the Oration against Ctesiphon.

MR. MAHAFFY.

Translate the following passages:—

1. *Beginning*, Sed numeris decor est et junctura addita crudis.
Ending, Nec pluteum caedit nec demorsos sapit ungues. PERS. Sat. i.

2. *Beginning*, Sed Juppiter audiet. Eheu!
Ending, Nutrieras, peragant avidos sudare deunces? PERS. Sat. iii.

3. *Beginning*, Omnis
Ending, Verba. Soloeecismum liceat fecisse marito. JUV. Sat. iv.

4. *Beginning*, O parvi nostrique Lares, quos ture minuto
Ending, Quae Siculos cantus effugit remige surdo. JUV. Sat. vii.

5. *Beginning*, Vernaculorum dicta, sordidum dentem,
Ending, Constare gratis cum silentium possit? MARTIAL, x. 3.

1. What was Vespasian's attitude towards philosophy and literature?
2. What is known of the destruction of Pompeii?
3. Discuss the character of Nerva.
4. Sketch the reforms of Domitian.
5. Describe Pliny's *Panegyricus*.
6. Notice the principal points in the war against the Dacians.

MR. ABBOTT.

GREEK PROSE.

She warned him of the Thrinakian land, where the cattle of Helios feed in their sunny pastures. There, each evening, as the sun goes down, and each morning as he rises from the eastern sea, two fair maidens came forth to tend them. These children of Helios, their mother—tender and loving as the light of early day—placed far off in the Thrinakian land, to tend their father's herds. 'Wherefore go not near that island,' said the Lady Kirkê, 'for no mortal man shall escape the wrath of Helios if any hurt befall his cattle. And if thy comrades stretch forth a hand against them, thy ship shall be sunk in the deep sea; and if ever thou mayest reach thy home, thou shalt return to it a lonely man, mourning for all the friends whom thou hast lost.'

LATIN PROSE.

Every thing gave the jealous tyrant fear and offence. Was a man nobly born, and popular? he withdrew the affections of the people, rivalled the prince, and threatened a civil war. Was he afraid of popularity, and lived retired? he gained fame by shunning it, was still an eye-sore, and his best fate was, to leave his country. Was he virtuous, and his life and morals without blame? he was another Brutus, and, by the purity of his manners, upbraided the vicious behaviour of the emperor. . . . If he was rich, he was too wealthy for a subject; and great wealth in private hands boded ill to princes: if he was poor, he was thence the more enterprising and desperate. In short, no man could possess any advantage or quality that rendered him acceptable to his fellow-citizens, and a blessing to his country, to his friends, or to himself, but such quality and advantage were sure to awaken the jealousy and vengeance of the tyrant, and procure his doom.

LATIN VERSE.

Greetings to thee, sparkling streamlet,
 What a gentle voice is thine!
 How the ripples on thy bosom
 Lightly laugh and sweetly shine!

Moon and stars gaze kindly on thee,
 And for thee the nightingale
 Pours a flood of thrilling music,
 Overflowing hill and vale.

Childhood's dreams are hovering near me,
 And the past appeareth plain,
 But the rosy days of childhood
 Never will return again.

Even so recede thy waters
 To their parent source no more ;
 Hasten to the heaving ocean,—
 And their tranquil life is o'er !

O thou ever restless streamlet,
 Faithful type of youth thou art !
 Youth that rushes on to perish,
 Spurning peace with reckless heart !

GREEK VERSE.

Cas. Who's there ?
Casca. A Roman.
Cas. Casca, by your voice.
Casca. Your ear is good. Cassius, what a night is this !
Cas. A very pleasing night to honest men.
Casca. Who ever knew the heavens menace so ?
Cas. Those that have known the earth so full of faults.
 For my part, I have walked about the streets,
 Submitting me unto the perilous night ;
 And thus unbraced, Casca, as you see,
 Have bared my bosom to the thunder-stone.
 And when the cross blue lightning seemed to open
 The breast of heaven, I did present myself
 Even in the aim and very flash of it.
Casca. But wherefore did you so much tempt the heavens ?
 It is the part of men to fear and tremble,
 When the most mighty gods, by tokens, send
 Such dreadful heralds to astonish us.

Modern History.

PROFESSOR BARLOW.

1. What were the causes of the gradual decline of Venice in the fifteenth and sixteenth centuries ?
2. Charles V. has been charged with treachery in the case of the Landgrave Philip of Hesse. What is the story ?
3. What were the two treaties of Cateau-Cambresis, April 2nd and 3rd, 1559 ?
4. Describe the state of the religious parties in France at the time of the death of Francis, duke of Guise.
5. Give an account of the siege of Malta, 1565.

6. Describe the condition of the Netherlands at the time of the abdication of Charles V.
7. Give an account of the embassies of Egmont and Montigny to Madrid.
8. Mr. Motley ascribes to William de Blois, seigneur of Treslong, the merit of laying a corner-stone of the Batavian Commonwealth. Give an account of the transaction referred to.
9. Describe the military expeditions for the relief of Tergoes (Oct., 1572), and for the recovery of the island Duyveland (Sept., 1575).
10. What was (a) "the Spanish Fury," (b) "the French Fury?"
11. The ancient Aragonese constitution was destroyed by Philip II. By what means?
12. What were the most important events in the reign of the emperor Maximilian II.?

PROFESSOR DOWDEN.

1. Give an account of the negotiations between King Henry VII. and King Charles VIII. previous to the invasion of Brittany by the latter.
2. Justify, by laws of the fourth and fifth years of Henry's reign, Bacon's statement that Henry VII. may "be celebrated as the best law-giver to this nation after King Edward I."
3. Henry VII. was "wonderful diligent to observe what became of the King of Arragon [Ferdinand, after the death of Isabella] in holding the kingdom of Castile." Why?
4. Write a notice of the various methods employed by Henry VII. to fill his treasury.
5. In the history of the reign of Henry VII. what part is played by
 - (a) Peter Hialas,
 - (b) John, Earl of Lincoln,
 - (c) The Lord Ravenstein.
6. Relate the visit of Louis XI. to the Duke of Burgundy at Peronne, and its consequences. What were the principal terms of the treaty of Peronne?
7. Relate the events which led to the death of the Constable de St. Paul.
8. Write a sketch of the war of the Duke of Burgundy with the Swiss (1476).
9. What were the events which led to the visit of Commynes to Italy, 1478.
10. Write a sketch of the history of Mary, Duchess of Burgundy, from the death of Charles the Bold to her marriage.

Modern Literature.

ENGLISH LITERATURE.

PROFESSOR DOWDEN.

1. Write a short Essay founded on "Utopia," B. I, upon reforms needed in England in the time of More.
2. Give some account of moral philosophy among the Utopians.
3. Give some account of the religious services in Utopia.
4. From the materials supplied by Charles Lamb write a notice of the peculiar excellences of the poetry of Beaumont and Fletcher. Give illustrations.
5. Write a notice of some of the creations of female character by Webster and by Ford.
6. Exhibit your acquaintance with a passage of the Tragedy and of the Comedy of Ben Jonson.

MR. PALMER.

1. What internal evidence is there for the date of Sidney's *Apologie for Poetrie* ?
What was the motive for the production of the *Apologie* ?
2. Illustrate from the *Apologie* the wide sense in which Sidney would use the word "poet."
3. In what respects does poetry surpass history and philosophy, according to Sidney ?
4. What should be the three wings of the Dedalus of poetry, according to Sidney ?
5. What exception does Sidney make while condemning the drama of his day ?
6. What allusion to Ireland occurs in the *Apologie* ?
7. Compare the object of the first and second books of the *Faery Queene*.
8. Give the derivation of the following names, and state their share in the action: *Acrasia, Perissa, Elissa, Maleger*.
9. What do you consider the best known and most beautiful passage in the *Faery Queene* ?
10. What poets have been most deeply impressed by the example of the *Faery Queene* ?

SUBJECTS FOR COMPOSITION.

[Choose one.]

1. *Pathos* : treating especially—

- (a) The proper *loci* of pathos ;
- (b) The relative merits of poetry and prose as vehicles of pathos ;
- (c) The chief masters of the pathetic.

2. On rhapsody : with respect chiefly to the *κἀθαροίς* or ennobling effect produced on the mind by good ballad poetry.

GERMAN.

MR. BARLOW.

1. "In der That ist 'Oberon' nicht nur aus zwei, sondern, wenn man es genau nehmen will, aus drei Haupthandlungen zusammengesetzt" ?

2. Point out the connexion of the following passages with the general argument of the poem :—

- (a). "Der Sklaverei, worin das gute junge Weib
Seit dieser Zeit verlehzt, ist keine zu vergleichen.
Stets angeschnallt an seinen siechen Leib,
Darf sie ihm Tag und Nacht nicht von der Seite weichen."
- (b). "Den Rost der Welt, der Leidenschaften Spur,
Hat längst der Fluss der Zeit von ihm hinweggewaschen.
Fiel' eine Kron' ihm zu und es bedürfte nur,
Sie mit der Hand im Fallen aufzuhaschen,
Er streckte nicht die Hand."
- (c). "Mit schelem Auge nimmt der Heid' aus Hüon's Hand
Den Becher voll, und wie er an der Lippen Rand
Ihn bringt, versiegt der Wein, und glühend wird der Becher
In seiner Faust, der innern Schalkheit Rächer !"
- (d). "In Kurzem ist ganz Tunis in Alarm,
Und Niemand kann auf seiner Stelle bleiben ;
Selbst Podagra und Zipperlein und Gicht
Und Todeskampf befreit von dieser Tanzwuth nicht."
- (e). "Die Nymphen neigten sich und flohn
In einem Wölkchen schnell hinweg mit Hüon's Sohn."

3. Explain the historical allusions in the following lines :—

"Zu Aachen in seiner Kaiserpracht
Im alterthümlichen Saale
Sass König Rudolphs heilige Macht
Beim festlichen Krönungsmahle.

Die Speisen trug der Pfalzgraf des Rheins,
 Es schenkte der Böhme des perlenden Weins,
 Und alle die Wähler, die Sieben,
 Wie der Sterne Chor um die Sonne sich stellt,
 Umstanden geschäftig den Herrscher der Welt,
 Die Würde des Amtes zu üben."

4. Exhibit your acquaintance with these poems of Schiller :—

- (a). "Die vier Weltalter."
- (b). "Das verschleierte Bild zu Sais."
- (c). "Der Gang nach dem Eisenhammer."

5. Translate into English :—

"In einem Zeitalter der Auflösung und Zersetzung, des Uebergangs zu neuer, besserer Bildung, als die bisherige gewesen, wo wir weder den phantastischen und kraftvoll rohen Gestalten des Mittelalters noch den kühnen, die Wirklichkeit der Dinge ergreifenden Geistern der modernen Zeit begegnen, steht demnach der Herzog von Gloucester, in seinem Vaterlande freilich noch sehr vereinzelt, als ein ahnungsvoll in die Zukunft schauender Mann da. Thorheit und echtes Wissen, Aberglaube und Aufklärung freilich sind dabei bunt durch einander gemischt. In einer Schrift des Sir Thomas More hat sich eine artige Erzählung erhalten, wie Herzog Humfrid, der nicht mehr an Wunder und Legenden glaubte, einst zu St. Albans, wo er mancherlei Beziehungen gehabt zu haben scheint, einen bettelnden Betrüger, der sich blind gestellt und durch Berührung der Reliquien sehend geworden sein wollte, mit scharfem Spott entlarvt habe."

6. Translate into German :—

"Before he made any attempt abroad, he rightly judged that it was necessary for him to begin by the conversion of his own household. Having therefore retired with his family, as he had done several times before, to the above-mentioned cave in Mount Hara, he there opened the secret of his mission to his wife Khadijah; and acquainted her that the angel Gabriel had just before appeared to him, and told him that he was appointed the apostle of God: he also repeated to her a passage which he pretended had been revealed to him by the ministry of the angel, with those other circumstances of his first appearance which are related by the Mohammedan writers."

FRENCH.

DR. ATKINSON.

Translate :—

I.

N'y épargnez rien, grande reine : employez-y l'or et tout l'art des plus excellents ouvriers; que les Phidias et les Zeuxis de votre siècle déploient toute leur science sur vos plafonds et sur vos lambris; tracez-y de vastes et déli-

cieux jardins, dont l'enchantement soit tel qu'ils ne paraissent pas faits de la main des hommes; épuisez vos trésors et votre industrie sur cet ouvrage incomparable; et, après que vous y aurez mis, Zénobie, la dernière main, quelqu'un de ces pâtres qui habitent les sables voisins de Palmyre, devenu riche par le péage de vos rivières, achètera un jour à deniers comptants cette royale maison pour l'embellir et la rendre plus digne de lui et de sa fortune.

II.

Mais si on demande comment le sang des veines ne s'épuise point en coulant ainsi continuellement dans le cœur, et comment les artères n'en sont point trop remplies, puisque tout celui qui passe par le cœur s'y va rendre, je n'ai pas besoin d'y répondre autre chose que ce qui a déjà été écrit par un médecin d'Angleterre, auquel il faut donner la louange d'avoir rompu la glace en cet endroit, et d'être le premier qui a enseigné qu'il y a plusieurs petits passages aux extrémités des artères, par où le sang qu'elles reçoivent du cœur entre dans les petites branches des veines, d'où il va se rendre derechef vers le cœur; en sorte que son cours n'est autre chose qu'une circulation perpétuelle.

-
1. (a) Write a notice on the life of Descartes.
 - (b) Descartes has given three demonstrations of the existence of God?
 - (c) What are the four chief precepts of his new *méthode*?
 - (d) la certitude de l'existence des corps repose donc sur la certitude de l'existence de Dieu?
 - (e) D.'s method is a psychological method?
 2. Write out (in French) a brief analysis of Guizot's introductory lecture.
 3. Write an article on Voltaire as a *poet*.
 4. Write out any lines of Racine you remember in which the following words or phrases occur:—
 dépit, brigue, se régler sur, éclater, c'est à vous (à) de, assembler.
 s'arracher (à) de, à ses yeux, parmi, tandis, intelligence, tremper
 (à) dans.
 6. (a) Translate—
 1. Ne saurait-il rien voir qu'il n'emprunte vos yeux?
 2. Ses yeux sont déjà faits à l'usage des larmes.
 3. (Pourquoi) m'avez vous relégué dans ma cour?
 4. Mais je mettrai ma joie à le désespérer.
 5. Se vit exclu du rang vainement prétendu.
 6. L'ingrate qu'il aime au mépris de ma sœur.
 7. Avez vous prétendu qu'ils se tairaient toujours.
 8. Toujours faire le pied de grue.
 9. Donner dans le panneau.
 10. Je les mets à pis faire.

11. Tant y'a qu'il n'est rien que votre chien ne prenne.
12. Tout vous livre à l'envi le rebelle Hippolyte.
13. Contre un ingrat qui plait recourir à la fuite.
14. Daigna m'instruire au sortir de ses mains.

(b) Translate and write grammatical notes on these sentences :—

de s'ouïr par ma voix *dicter* vos volontés.

il *lui* fera croire ce qu'il voudra.

si vous m'*en* croyez.

ce dont on n'a que faire.

7. Write (in French) an extended article on Racine with special reference to the criticism of the appointed plays.

Translate into French :—

I cannot but admire the customs of your Provence ladies; the description you give me of their ceremoniousness is a finished piece in its kind: but do you know that it would make me just mad, and that I cannot conceive how you away with it. You imagine that I should do admirably well in Provence; far from it, I assure you I should be downright rude; any thing unreasonable vexes me, and the want of sincerity offends me. I should say to them, ladies, let us understand one another; am I to wait on you back again? If I am, I desire you will not prevent me, nor let us stand wasting our time and breath to no purpose: if it is what you do not desire, pray spare me the ceremony of making the offer. I am not in the least surprised, if such a way of proceeding puts you out of patience; I should have still less than yourself.

1. Draw out a table of the changes to which Latin vowels are liable in their passage into Mod. French.

2. Account for the want of a feminine inflection of *leur*.

(b). for the *t* in *va-t-il*;

for the *s* in *vas-y*! *promènes-y-toi*;

donné-je? *me promène-je?* [are these correct?]

(c). for the *s* in *lisant*, *disant* [other similar forms?]:—

for the *ss* in *maudissant*:

3. Write out in full the conjugation of *avoir* and *être*, explaining the forms.

4. Explain the formation of the following words:—

éteindre, *enfreindre*, *oindre*, *paître*, *envoyer*, *cueillir*, *bénir*, *fuir*,
pouvoir, *savoir*, *suivre*, *craindre*, *coudre*, *moudre*;

and show how the conjugation is thereby influenced.

5. What is the origin of the words—

aucun, *même*, *plusieurs*, *chaque*, *mon*, *cet*, *pire*, *mieux*, *onze*, *huit*,
on, *en*, *y*, *dont*, *autrui*, *quoi*.

Natural Science.

ZOOLOGY.

DR. MACALISTER.

1. What are the characters distinctive of the Myxinoid fishes?
 2. Describe the suspensorium of a tadpole.
 3. Give an outline of the classification of Ophidia.
 4. Contrast Sauropsida with Ichthyopsida.
 5. Give the characters of the recent genera of Ganoid fishes.
 6. Describe the vertebral column of Cetaceæ.
 7. What are the characters of the neck vertebræ in Ungulates and Tylopoda?
 8. Give the primary subdivision of Vermes.
 9. How do the Echinodermata differ from the Vermes?
 10. How do Mollusca differ from Molluscoida?
-

BOTANY.

DR. E. PERCEVAL WRIGHT.

1. Describe Cellulose, and give its chemical formula.
 2. What organised products are found in cells?
 3. Describe some of the appearances presented by Chlorophyll.
 4. Give Allman's views of the structure of the Starch Granule.
 5. Describe free-cell formation.
 6. Mention the structures met with in a Pollen grain.
 7. How is the irritability of the leaves of *Mimosa pudica* to be accounted for?
-

SENIOR FRESHMEN.

Mathematics.

A.

MR. WILLIAMSON.

1. From the centre C of an ellipse, the line CN is drawn perpendicular to the chord AB , joining two vertices of the curve: prove that the semiaxes of the confocal ellipse touching AB are equal to AN and BN , respectively.

2. Two of the angular points of a *given* triangle move along fixed right lines: show that the locus described by the remaining angle is an ellipse, and determine its axes in magnitude and direction.

3. Prove the expansion

$$\cos mx = 1 - \frac{m^2 \sin^2 x}{1 \cdot 2} + \frac{m^2 (m^2 - 4) \sin^4 x}{1 \cdot 2 \cdot 3 \cdot 4} + \&c.,$$

m being any integer.

4. Find the true value of

$$\frac{\sqrt{3 + \cos 2x - 2 \sin x}}{x \sin 2x + 2x \cos x}$$

when $x = \frac{\pi}{2}$.

DR. TRAILL.

5. If
$$u = \frac{aX^2 + 2bXY + cY^2}{a'X^2 + 2b'XY + c'Y^2},$$

show that the maximum and minimum values of u depend on the roots of the quadratic

$$(b'^2 - a'c')u^2 - (ac' + a'c - 2bb')u + (b^2 - ac) = 0,$$

and show that the coefficients of this quadratic are not altered by linear transformation.

6. Draw two conjugate diameters of an ellipse so that the sum of the perpendiculars from their extremities on the axis major shall be a maximum.

7. If the bisector of the vertical angle of a spherical triangle cut the base into segments s_1, s_2 , and if the segments made by the perpendicular

from the vertex on the base be $s_3 s_4$, and if a, b be the sides, prove the following equation :—

$$\frac{1 - \cos(s_1 - s_2)}{1 + \cos(s_3 - s_4)} \cdot \frac{1 + \cos(a - b)}{1 - \cos(a - b)} = \frac{\sin(s_1 - s_2)}{\sin(s_3 - s_4)}.$$

8. Given four tangents to a parabola, find its focus and directrix.

MR. PANTON.

9. If $L = (a + \beta - \gamma - \delta)^2$, $M = (a + \gamma - \beta - \delta)^2$, $N = (a + \delta - \beta - \gamma)^2$, and $P = L + \omega M + \omega^2 N$, $Q = L + \omega^2 M + \omega N$, where ω, ω^2 are the imaginary cube roots of unity; prove that

$$P^2 + Q^2 = 64 \{ (a - \delta)(\beta - \gamma) + (a - \gamma)(\beta - \delta) \} \{ (a - \beta)(\gamma - \delta) + (a - \delta)(\gamma - \beta) \} \{ (a - \gamma)(\delta - \beta) + (a - \beta)(\delta - \gamma) \}.$$

10. If

$$\Delta = \begin{vmatrix} 1 & 1 & 1 & 1 \\ a & \beta & \gamma & \delta \\ a^2 & \beta^2 & \gamma^2 & \delta^2 \\ a^4 & \beta^4 & \gamma^4 & \delta^4 \end{vmatrix}, \text{ prove that}$$

$$\frac{d\Delta}{da} + \frac{d\Delta}{d\beta} + \frac{d\Delta}{d\gamma} + \frac{d\Delta}{d\delta} = 4 \begin{vmatrix} 1 & 1 & 1 & 1 \\ a & \beta & \gamma & \delta \\ a^2 & \beta^2 & \gamma^2 & \delta^2 \\ a^3 & \beta^3 & \gamma^3 & \delta^3 \end{vmatrix}.$$

11. Find the locus of the intersection of two variable tangents to a conic which intercept on a fixed tangent distances measured from the point of contact the sum of whose squares is constant.

12. The eccentric angles of two points P, Q on an ellipse are ϕ, ϕ' ; prove that the area of the quadrilateral whose vertices are the centre, the points P, Q , and the pole of the chord PQ is

$$ab \tan \frac{1}{2}(\phi - \phi').$$

B.

MR. WILLIAMSON.

1. In a plane triangle, if a and b be constant, prove the following relation between the differentials of the opposite angles :

$$\frac{dA}{\sqrt{a^2 - b^2} \sin^2 A} = \frac{dB}{\sqrt{b^2 - a^2} \sin^2 B}.$$

2. If A and B be the points of contact of the tangents OA and OB to a parabola, whose focus is F : prove that the angle OFA is the supplement of the angle AOB .

3. Transform $x dy - y dx$, being given

$$x = a \cos \theta + b \cos \phi, \quad y = a \sin \theta + b \sin \phi;$$

a and b being constants.

4. Find the condition that the line

$$\lambda x + \mu y + \nu = 0$$

should touch the conic

$$ax^2 + 2hxy + by^2 + 2gx + 2fy + c = 0.$$

5. If a curve be such that the distances ρ and ρ' of each point from two fixed points are connected by the relation $l\rho + m\rho' = d$: find its equation in rectangular co-ordinates.

DR. TRAILL.

6. A line of given length moves, with its extremities on two fixed right lines: find the locus of the intersection of perpendiculars to the given lines at those extremities. If the line, instead of being of a constant length, pass through a fixed point, find the locus.

7. The co-ordinates of the vertices of a triangle are $(-2, -5)$, $(4, -1)$, $(3, -2)$: find the equation of the circumscribing circle, and also the equation of the polar of the point $(1, -1)$ with regard to the circumscribing circle.

8. If $z = x\phi(ax + by) + y\psi(ax + by)$, prove that

$$a^2 \frac{d^2 z}{dy^2} - 2ab \cdot \frac{d^2 z}{dx dy} + b^2 \frac{d^2 z}{dx^2} = 0.$$

9. Find the limiting value of

$$\frac{\tan nx - n \tan x}{n \sin x - \sin nx}.$$

when $x = 0$; and also the value of

$$\left(\frac{a}{x} + 1\right)^x$$

when $x = \infty$.

10. If the biquadratic

$$a_0 x^4 + 4a_1 x^3 + 6a_2 x^2 + 4a_3 x + a_4 = 0$$

be deprived of its second term, prove that the resulting equation is

$$a_0^4 X^4 + 6a_0^3 H \cdot X^3 + 4a_0^2 G \cdot X + (a_0^2 I - 3H^2) = 0,$$

where

$$H = a_0 a_2 - a_1^2,$$

$$G = a_0^3 a_3 - 3a_0 a_1 a_2 + 2a_1^3,$$

$$I = a_0 a_4 - 4a_1 a_3 + 3a_2^2.$$

MR. PANTON.

11. If $y = e^{ax} \cos rx$, find $\frac{d^n y}{dx^n}$.

12. Find the value of

$$x \tan x - \frac{\pi}{2} \sec x, \text{ when } x = \frac{\pi}{2};$$

and of

$$\left(\frac{\tan x}{x} \right)^{\frac{1}{x}}, \text{ when } x = 0.$$

13. Prove the following formula for the area of a spherical triangle in terms of two sides and the included angle:—

$$\cot \frac{1}{2} \Sigma = \frac{\cot \frac{1}{2} a \cot \frac{1}{2} b + \cos C}{\sin C}.$$

How may this expression be exhibited by a geometrical construction?

14. Find the condition that the cubic

$$x^3 - px^2 + qx - r = 0$$

should have a pair of roots of the form $A \pm A \sqrt{-1}$; and find in that case all the roots.

15. Given in magnitude and position two conjugate semidiameters of a central conic, determine the axes.

LIMITED COURSE.

MR. WILLIAMSON.

1. In a spherical triangle, prove that the perpendiculars from the angles on the opposite sides intersect in the same point.

2. If α and β be the roots of the equation

$$(h^2 - ab)x^2 + 2(hf - bg)x + f^2 - be = 0,$$

find the value of $(\alpha - \beta)^2$.

3. Given the vertical angle of a triangle, and the sum of m times one side and n times the other: find the locus of the centre of the circumscribing circle.

4. In a right-angled triangle, we have

$$\frac{1}{a^2} + \frac{1}{b^2} = \frac{1}{p^2},$$

where p is the perpendicular from the right angle on the hypotenuse: find the analogous theorem in a spherical right-angled triangle.

5. Find the co-ordinates of the radical centre of the circles

$$x^2 + y^2 - 2x - 4y - 2 = 0, \quad x^2 + y^2 - 6x + 4 = 0,$$

$$\text{and } x^2 + y^2 + 8x + 2y + 8 = 0.$$

6. Resolve into partial fractions the expression

$$\frac{2x + 3}{x^3 + x^2 - 2x}.$$

DR. TRAILL.

7. If the sum of five numbers in arithmetical progression be 55, and the sum of their squares 765; find them.

8. Find the area of the triangle, the co-ordinates of whose vertices are (2, 3), (4, -5), (-3, -6).

9. If on the sphere, two great circles be described through any point, one cutting and the other touching a small circle, and if s and s' be the segments of the secant, and t the length of the tangent, prove that

$$\tan \frac{1}{2} s \cdot \tan \frac{1}{2} s' = \tan^2 \frac{1}{2} t.$$

10. Given the base of a spherical triangle, and the locus of the vertex a great circle, construct the triangle with the minimum sum of sides.

11. Find analytically the locus of a point, such that the sum of the squares of its distances from any number (n) of points be given.

12. If $s_1, s_1', s_2, s_2', s_3, s_3'$, be the segments of the sides of a triangle (a, b, c) made by the bisectors of the angles, prove that

$$s_1 s_2 s_3 = s_1' s_2' s_3' = \frac{a^2 b^2 c^2}{(a+b)(b+c)(c+a)}.$$

MR. PANTON.

13. Find the angle contained by the lines represented by the equation

$$Ax^2 + Bxy + Cy^2 = 0;$$

and find also the equation of the lines bisecting the angles between those lines.

14. Find the equations of the two parallel lines drawn to touch the circle $(x - \alpha)^2 + (y - \beta)^2 = r^2 = 0$, and to cut the line $Ax + By + C = 0$ at a given angle.

15. Prove that the sines of the angles of a spherical triangle are in the same ratio as the sines of the opposite sides.

16. Prove the formula in a spherical triangle

$$\cot a \sin b = \cot A \sin C + \cos b \cos C.$$

17. Given the perimeter $2p$, and the three angles A, B, C of a plane triangle; express in terms of these quantities the sides a, b, c .

18. Solve the equations

$$x^2 + y^2 = 49,$$

$$(x - 6)^2 + (y - 8)^2 = 9;$$

and give the geometrical interpretation of the result.

Logics.

—
DR. STUBBS.

1. Whewell's division of the field of Science, although a real and fundamental distinction, is in its phraseology philosophically objectionable.
2. How does Mill explain the fact that Mechanics is a demonstrative science and Chemistry not?
3. What are the three circumstances in which a law of Causation may be resolved into other laws? Give examples of each mode.
4. In applying the method of concomitant variations to cases in which the variations are those of quantity, we must keep two cautions in mind.
5. In what cases of heteropathic effects is it easier to find the effect than the cause? and where is this mode of investigation not applicable?
6. How does Mill exemplify three of the four inductive methods in the Theory of Dew.
7. The variation and the translation of an experiment are each three-fold, according to Bacon? Give examples of the several kinds of each.
8. What are the four kinds of *Idola*, and whence are they derived? Give examples.

—
DR. TARLETON.

1. What fact lies at the root of the distinction made by the Aristotelian logicians between genera and species and those classes which they did not count as genera or species.
What is meant by *Differentia*, *Proprium*, and *Accidens*, and on what is the distinction between them founded?
2. How does Mill show that to define a name may not only be an inquiry of considerable difficulty, but may involve considerations going deep into the nature of the things which are denoted by the name?
3. It is clear, according to Mill, that in the estimation of those logicians who regard the Dictum as the ultimate principle of all valid reasoning, the propositions of which reasoning are composed can be the expression of nothing but the process of dividing things into classes, and referring everything to its proper class. Show that this is an unfair criticism on the Dictum, whose unfairness is rendered particularly striking by a remark immediately subsequent taken in connexion with an admission made in Book ii.
4. Why has a syllogism on Mill's principles a better right than conversion to be regarded as a process of inference?
5. When Mill denies Whately's assertion that syllogizing is the mode in which all men must reason, what is really the only point at issue between them?

Give a syllogism illustrating this.

What is the similarity between Mill's theory of inference and Brown's theory of the syllogism, and what is the distinction between the two?

6. What is the distinction, according to Mill, between sciences which can be made deductive and those which must remain experimental?

He omits to mention the chief reason for the deductive character of Mathematics.

Attention to this feature of Mathematics might have led him to see the incorrectness of his statement, that in any science by reasoning from a set of hypotheses we may obtain a body of conclusions as certain as those of Geometry.

7. In denying that Arithmetical propositions are identical Mill appears to extend his assertion too far.

What is really the nature of an arithmetical truth which is not a mere identical proposition?

8. How does Mill show that it is incorrect to suppose that the peculiar nature of the evidence of ratiocination consists in the impossibility of admitting the premises and rejecting the conclusion without a contradiction in terms.

LOCKE, AND THE ARISTOTELIAN LOGIC.

DR. SHAW.

1. What internal evidence does the Essay supply that the Introduction was written before the work was fully thought out?

2. Locke enforces by a list of examples his fundamental position, that "that which the mind of man is employed about in thinking is the ideas that are there." An important class of ideas is not represented among the examples?

3. "In time," says Locke (Book ii., chap. i., § 24), "the mind comes to reflect on its own operations, about the ideas got by sensation, and thereby stores itself with a new set of ideas, which I call ideas of reflection. These are the impressions that are made on our senses by outward objects, that are extrinsic to the mind, and its own operations, proceeding from powers intrinsic and proper to itself; which when reflected on by itself, becoming also objects of its contemplation, are, as I have said, the original of all knowledge."

Explain the latter obscurely worded passage, or propose an emendation of it, assuming it to be affected with clerical errors.

4. What subject does Locke interpolate between his treatment of simple ideas and that of complex; and how does he justify this order of procedure?

5. In what consists, according to Locke, the identity (a) of a piece of dead matter, (b) of a vegetable or animal, (c) of a person?

6. After laying down the three ends of language, Locke observes three cases of failure respecting the first end, two respecting the second, and one respecting the third.

7. What distinction does Locke make as regards simplicity between the qualities that affect our senses and the ideas which they produce in the mind?

8. Into what *petitio principii* does Locke fall in his account of the origin of our idea of Causation?

9. If the conclusion be substituted for the minor premiss in a syllogism, and the new premises be legitimate, the new syllogism cannot be in the 2nd or 4th figure, nor the old one in the 1st or 3rd.

10. Investigate in what figure a premiss may be particular and yet its extreme universal in conclusion.

11. Determine the modes in the fourth figure on the following hypotheses:—

(a) That the major is particular.

(b) That the minor is particular.

(c) That the conclusion is universal.

12. Show that if a sorites the first premiss must be affirmative, the last universal, and all the intermediate ones both affirmative and universal.

CLASSICS.

SOPHOCLES.

MR. POOLE.

Translate the following passages into English Prose:—

1. *Beginning*, ἡ που τὸν ἐφέσπερον, κ. τ. λ.

Ending, ἰωρήσασα τοῦμὸν ὄμμα.

Œdip. Col., 1059–1083.

2. *Beginning*, ΚΡ. ἄγων ἔρημος ἐνθ' ἂν ὃ βροτῶν στίβος, κ. τ. λ.

Ending, ΧΟ. θεσμῶν. ἄμαχος γὰρ ἐμπαιζει θεὸς Ἀφροδίτα.

Antigone, 773–800.

3. *Beginning*, ΧΟ. ὦρα τιν' ἤδη κάρα καλύμμασι κρυψάμενον ποδοῖν, κ. τ. λ.

Ending, ΧΟ. τό τοι διπλάζον, ὦ γύναι, μείζον κακόν.

Ajax, 245–268.

4. *Beginning*, προσθείς τε χεῖρα δεξιάν, τὰ τόξα μου, κ. τ. λ.

Ending, γνώμην μετοίσεις· εἰ δὲ μὴ, θάνοις κακῶς.

Philoctetes, 942–962.

1. Write notes where required, on the first passage.

2. How does Müller describe the process of formation of a new language?

3. What is the proper criterion of relationship between two languages?

4. How does Müller argue that Latin can never have passed through the Greek or Pelasgic stage?
5. Give his argument for ascertaining the situation of the country anciently called Ophir?
6. Into what classes does Müller distinguish derivative elements; and give examples of them?
7. Show that the Choral Odes of Sophocles fulfil the condition required by Horace?
8. To what circumstance does Müller attribute the transfer of the Dithyramb, and of Tragedy, from Bacchus to Heroes, and not to other gods?
9. Show that the character of the Greek Drama required that all actions involving violence should take place behind the scenes?
10. Müller notices some Dramatic elements in Greek religious ceremonies?
11. Write a sketch of the chief events in the life of Cimon?

MR. ABBOTT.

Translate the following passages :—

1. *Beginning*, EU. Volui animum tandem confirmare hodie meum,
Ending, Ut fortunatas faciat gnatae nuptias.
PLAUTUS, *Aulularia*, act II. sc. viii. 1-8.
2. *Beginning*, MU. At enim ille hinc amat meretricem ex proximo . . .
SE. Sane sapit;
Ending, Multo tanto illum accusabo, quam te accusavi, amplius.
Ibid., *Menaecheus*, act II. sc. ii. 39-49.
3. *Beginning*, LV. Edepol deum virtute dicam, pater, et maiorum et tua . . .
Ending, Qui illic habitat. PH. Quin comedit quod fuit, quod non fuit?
Ibid., *Trinummus*, act II. sc. ii.
4. *Beginning*, A. Geta. G. hem. A. quid egisti? G. emunxi argento senes.
Ending, In nervom potius ibit.
TERENCE, *Phormio*, act IV. sc. iv.
5. *Beginning*, PH. Nil apud me tibi
Ending, Profecto in hac re nil mali est, quod sit discidio dignum.
Ibid., *Hecyra*, act V. sc. ii.

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1. Describe the circumstances and condition of the *familia rustica*.
 2. What evils resulted, according to Mommsen, from the policy of the Roman government with respect to the supply of corn?
 3. Give some illustrations of the new Hellenising spirit at Rome in the 6th century A. U. C.
 4. What were the causes of the exclusively Hellenist character of the Roman comedy?

5. What are the chief differences of opinion as to the fundamental principles of Plautine prosody?

6. Explain :

dictum facessas doctum.
qui nisi adsint quum citentur, census capiant ilico.
te . . . pipulo hic differam.
restim ductares saltabis
quid tibi nos tactio est?

MR. MAHAFFY.

Translate the following passage into Latin prose :—

When Lucullus, who was sitting at a banquet, heard that his soldiers had mutinied, and refused to follow him into the East, his disappointment and anger almost overcame him. But when a lady present challenged him to tell the cause of his sudden dejection, he recovered his temper with an effort, and said gaily: "I was considering what hot work Alexander must have had in India. I think I shall go home, and try to get more out of life than he did." Thereupon the conversation turned upon the King of Macedonia, and some of the guests even politely asserted that he was not a greater man than their present general. Lucullus showed no farther sign of ill-humour, but observed with a bitter smile that Alexander had made his army so invincible, that they defeated even their own general.

Translate the following passage into Greek prose :—

This excites our wonder in him, gentlemen, that he made so many his friends and kept them his friends by his attentions—he shared with all of them whatever he possessed—he was ready to assist them with his money and his influence, and spared no toil nor crime, if crime was necessary, in their behalf:—he changed his nature and adapted it to the occasion. With the steady he was serious, with the loose jovial—grave in the company of the old, merry in the company of the young—bold in villany with the wicked, and effeminate with the licentious. With a disposition so complex and various, he had not only collected round him bold bad men out of every country on earth, but attracted to him by his simulated virtues many good men also. For he never could have made his nefarious attempt to destroy this empire, if the wild growth of so many vices had not rested on the roots of a nature in some respects gentle and long suffering. This article, therefore, may be rejected, and you may dismiss from your minds the charge of intimacy with Catiline; for it applies equally to many, and some even excellent men.

Translate the following into Greek Verse :—

Yet these were alight essays to those worse hardships
We suffer'd on the shore : our lodging near
The walls of the enemy, the dews of Heav'n
Fell on us from above, the damps beneath
From the moist marsh annoy'd us, shrouded ill
In shaggy cov'rings. Or should one relate
The winter's keen blasts, which from Ida's snows
Breathe froze, that pierc'd thro' all their plumes the birds
Shiver and die ; or th' extreme heat that scalds,
When in his mid-day caves the sea reclines,
And not a breeze disturbs his calm repose
But why lament these sufferings ? They are past ;
Past to the dead indeed ; they lie, no more
Anxious to rise. What then avails to count
Those, whom the wasteful war hath swept away,
And with their loss afflict the living ?

Translate the following into Latin Verse :—

As grows a widow'd vine in open fields,
It hangs its head, no mellow clusters yields ;
So droops the fragile stem, its topmost shoot
With nerveless tendril hangs about its root ;
That vine no husbandman nor rustic swain
Hath cared to tend or cultivate or train ;
But if by happier chance that selfsame vine
Around a husband elm its tendrils twine,
Then many a husbandman and rustic swain
Its shoots will tend and cultivate and train.
Even such the virgin, and unprized as much,
That fades, untended by a lover's touch,
But when in fulness of her maiden pride,
Some fitting mate has won her for his bride,
She's loved as never she was loved before,
And parents bless her, and are stern no more.

JUNIOR FRESHMEN.

Mathematics.

A.

MR. WILLIAMSON.

1. Find the least value of $ax + \frac{b}{x}$; x being real.

2. Find the value of $(4 + 3\sqrt{-1})^5$.

3. Eliminate ϕ from the equations

$$x = 3 \cos \phi + \cos 3\phi,$$

$$y = 3 \sin \phi - \sin 3\phi.$$

4. Find a fraction such that if the numerator be increased, and the denominator diminished, by 2, the reciprocal of the fraction will be the result; while if the numerator be diminished, and the denominator increased by 2, the result is less than the reciprocal by $1\frac{1}{18}$.

5. Solve the equations

$$\frac{17}{\sqrt{x+y}} - \frac{7\sqrt{x+y}}{x} = \frac{10x}{(x+y)^{\frac{3}{2}}},$$

$$\sqrt{x-y} = y-1.$$

DR. TRAILL.

6. Prove Euler's and Legendre's formulæ of verification, viz. :

$$\sin A = \sin(36^\circ + A) - \sin(36^\circ - A) - \sin(72^\circ + A) + \sin(72^\circ - A).$$

$$\cos A = \sin(54^\circ + A) + \sin(54^\circ - A) - \sin(18^\circ + A) - \sin(18^\circ - A).$$

7. Show that all the positive integral powers of $\cos \theta$ can be expanded in terms of the cosines of multiples of θ , and that the positive integral powers of $\sin \theta$ can be expanded in terms of cosines or sines of multiples of θ , according as the integral power is even or odd. Show this in the cases of the expansions of

$$\cos^4 \theta, \cos^5 \theta, \sin^4 \theta, \sin^5 \theta.$$

8. If a circle cut two intersecting circles orthogonally, it cuts harmonically the arcs of both intercepted between their points of intersection.

9. A toy consists of eighteen cubical blocks; on each side of five of them a head is painted, on each side of seven a body, and on each side of six a pair of legs. How many different figures can be made by piecing

them together, each figure being supposed to consist of a head, a body, and a pair of legs, in their proper relative positions?

10. Calculate the Naperian logarithm of 10 to seven places of decimals, using the formula

$$\log_e u = 2 \left\{ \frac{u-1}{u+1} + \frac{1}{3} \left(\frac{u-1}{u+1} \right)^3 + \frac{1}{5} \left(\frac{u-1}{u+1} \right)^5 + \dots \right\}.$$

MR. PANTON.

11. Prove the following expression for any side of a quadrilateral in terms of the other three sides and the angles between them:

$$d^2 = a^2 + b^2 + c^2 - 2bc \cos \hat{bc} - 2ca \cos \hat{ca} - 2ab \cos \hat{ab}.$$

12. The sides of a right-angled triangle are

$$a = 7.5, \quad b = 10, \quad c = 12.5;$$

calculate the numerical value of the expression

$$\sin 3A + \sin 3B + \sin 3C.$$

13. Prove the expansion

$$\log_e \frac{1+x}{1-x} = 2 \left\{ x + \frac{1}{3} x^3 + \frac{1}{5} x^5 + \dots \right\}.$$

14. The sum of three numbers in continued proportion is 43, and the sum of their squares is 1333; find them.

15. Solve the equation

$$\frac{1+x^3}{(1+x)^3} + \frac{1-x^3}{(1-x)^3} = 3.$$

B.

MR. WILLIAMSON.

1. Define a logarithm, and hence prove that

$$\log(A \times B) = \log A + \log B.$$

Being given $\log 2 = .30103$, and $\log 3 = .4771213$, find the values of $\log 48$, $\log 75$, and $\log (.0144)^{\frac{1}{2}}$.

2. Find the sum of the series

$$1 \cdot 2^2 + 2 \cdot 3^2 + 3 \cdot 4^2 + \&c.$$

to n terms.

3. If $\tan \theta = \sqrt{-1}$, prove that $\tan n\theta = \sqrt{-1}$, for all values of n .

4. Being given three sides of a quadrilateral, prove that its area is a maximum when the quadrilateral is inscribable in a semicircle; and show that the solution of the problem depends on that of a cubic equation.

5. A sum of money lying at interest amounted at the end of a year to £10,920. If the rate of interest had been 1 per cent. less, and the principal £100 more, the amount would have been the same. Find the principal, and the rate of interest.

DR. TRAILL.

6. Find the sum to n terms and to infinity of the series

$$\frac{1}{1 \cdot 2 \cdot 3} + \frac{1}{2 \cdot 3 \cdot 4} + \frac{1}{3 \cdot 4 \cdot 5} + \&c.$$

and more generally of the series

$$\frac{1}{a(a+b)(a+2b)} + \frac{1}{(a+b)(a+2b)(a+3b)} + \&c.$$

7. If $\frac{p_1}{q_1}, \frac{p_2}{q_2}, \frac{p_3}{q_3}, \dots, \frac{p_n}{q_n}$ represent all the successive fractions

converging to the value of $\frac{a}{b}$, prove the following converging series :

$$\frac{a}{b} = \frac{p_1}{q_1} + \frac{1}{q_1 q_2} - \frac{1}{q_2 q_3} + \dots \pm \frac{1}{b q_n}.$$

8. Prove the following equation :

$$\left(7 \log \frac{16}{15} + 5 \log \frac{25}{24} + 3 \log \frac{81}{80} \right) \left(16 \log \frac{16}{15} + 12 \log \frac{25}{24} + 7 \log \frac{81}{80} \right) = \log (5^{\log 8}).$$

9. Assuming the expansion of $\log(1+z)$, prove the following formula connecting the logarithms of three consecutive numbers :

$$\log(y+1) - 2 \log y + \log(y-1) = -2 \left\{ \frac{1}{2y^2-1} + \frac{1}{3} \left(\frac{1}{2y^2-1} \right)^3 + \frac{1}{5} \left(\frac{1}{2y^2-1} \right)^5 + \&c. \right\}$$

10. If 7 balls be drawn out of a bag containing 12, and be then replaced, and if 5 be afterwards drawn out, show that the chance that exactly 3 balls were common to both drawings is

$$\frac{5}{4} \cdot \left(\frac{5 \cdot 7}{9 \cdot 11} \right).$$

MR. PANTON.

11. If $L = (a + \beta - \gamma - \delta)^2$, $M = (a + \gamma - \beta - \delta)^2$, $N = (a + \delta - \beta - \gamma)^2$; prove that

$$L^2 + M^2 + N^2 - MN - NL - LM = 8 \left\{ (a - \beta)^2 (\gamma - \delta)^2 + (a - \gamma)^2 (\beta - \delta)^2 + (a - \delta)^2 (\beta - \gamma)^2 \right\}$$

o

12. If S_l , S_m , S_n be the sums of l , m , and n , terms respectively of an arithmetical series: prove that

$$\frac{m-n}{l} S_l + \frac{n-l}{m} S_m + \frac{l-m}{n} S_n = 0.$$

13. The sides of a triangle are a , b , c , and the angle contained by a , b , is C ; prove the expansion

$$2 \log c = \log a + \log b - \frac{a^2 + b^2}{ab} \cos C - \frac{1}{2} \frac{a^4 + b^4}{a^2 b^2} \cos 2C - \dots$$

14. If $\tan \frac{1}{2} \theta \tan \frac{1}{2} \phi = \frac{b-c}{b+c}$; prove

$$\frac{b^2 + c^2 - 2bc \cos \theta}{\sin^2 \theta} = \frac{b^2 + c^2 - 2bc \cos \phi}{\sin^2 \phi},$$

and $(b^2 + c^2 - 2bc \cos \theta)(b^2 + c^2 - 2bc \cos \phi) = (b^2 - c^2)^2$.

15. Prove that the sum of the diameters of the inscribed and circumscribed circles of a triangle is equal to

$$a \cot A + b \cot B + c \cot C.$$

C.

MR. WILLIAMSON.

1. Through a given point draw a right line such that its points of intersection with the sides of a given triangle, along with the given point, make a given anharmonic ratio.

2. Find a point for which three given circles can be inverted into three equal circles.

3. Two opposite angles of a rhombus move along a given circle, while a third angle moves along another circle; prove that the locus of its remaining angle is, in general, a circle.

Find when the locus becomes a right line.

4. Describe a quadrilateral of given species each of whose sides shall pass through a given point.

5. Prove and invert the following theorem:—When two variable lines intersecting on a fixed circle cut at a constant angle, the line passing through their other points of intersection with the circle envelopes a second fixed circle, concentric with the first.

DR. TRAILL.

6. If a hexagon be inscribed in a circle, the intersections of the three pairs of opposite sides lie on the same right line; prove this, and deduce the reciprocal theorem.

7. Prove that the radius of the circle described through any three of the centres of the four circles that can be drawn to touch the sides of a triangle, is equal to the diameter of the circle circumscribing the triangle.

8. Show how to invert any two circles into equal circles, and how to invert a system of coaxial circles of the limiting point species into a system of concentric circles.

9. If ABC be any triangle, and P the point of intersection of the perpendiculars of the triangle, prove that the "nine-points circle" of the triangle ABC touches the twelve circles which can be drawn to touch the sides of the three triangles APB , APC , BPC .

10. If three pairs of corresponding points on a right line, A and A' , B and B' , C and C' , be such that any two systems determined by four out of the six points, and the four corresponding points, have the same anharmonic ratio, show that two points M and N can be found upon the line, such that MN shall cut harmonically the distances AA' , BB' , and CC' .

MR. PANTON.

11. Prove that every circle which cuts two of the three diagonals of a complete quadrilateral harmonically cuts the third also harmonically.

12. Apply the method of inversion to the solution of the following problems:—

(a). To describe a circle passing through a given point, and intersecting two given circles at given angles.

(b). To describe a circle of a coaxial system dividing a given arc of a given circle in a given anharmonic ratio.

13. Given four points A, B, C, D on one right line, and three points A', B', C' on another; determine on the latter line a fourth point D' such that the anharmonic ratio of A', B', C', D' shall be equal to that of A, B, C, D .

14. If P, Q, R be the centres of squares described on the sides of a triangle ABC , prove that the sum of the areas of the three squares is equal to eight times the difference of the areas of the triangles PQR and ABC .

15. Draw through a given point two transversals which shall intercept given lengths on two given right lines.

D.

MR. WILLIAMSON.

1. In any triangle, find an expression for the radius of its circumscribed circle in terms of the sides.

2. The sides of a triangle are 13, 14, 15, respectively; calculate the length of the radius of its inscribed circle.

3. Given of a triangle, the base, vertical angle, and area; construct it.

4. Find the difference between

$$\frac{8 + \sqrt{45}}{8 - \sqrt{45}} \quad \text{and} \quad \frac{3 + \sqrt{5}}{3 - \sqrt{5}}.$$

5. Solve the equation

$$\sqrt{6x+1} + \sqrt{x+4} + \sqrt{6x+1} = 2.$$

6. Find the simplest form of the expression

$$\frac{x^2 - y^2}{x + \frac{y^2}{x^2}} \times \frac{1 - \frac{y}{x} + \frac{y^2}{x^2}}{1 - \frac{y^2}{x^2}}.$$

DR. TRAILL.

7. One-third of a population can read; of the remainder 45 per cent. can read and write; of what still remains 9 per cent. can read, write, and count; the balance is 500,500 who can neither read, write, nor count. Find the total population.

8 Find three numbers such that the product of the first and second shall be 493, of the second and third 1073, and of the first and third 629.

9. Solve the equations

$$\frac{x + \sqrt{x}}{x - \sqrt{x}} = \frac{x^2 - x}{4},$$

$$2x + 17 = 9\sqrt{2x - 1}.$$

10. Find two consecutive numbers whose cubes differ by 6487.

11. If the three perpendiculars of a triangle ABC intersect in O , and when produced intersect the circumscribing circle in G , H , and K , prove that the lines OG , OH , OK are bisected by the sides of the triangle; and if these points of bisection be D , E , F , prove that $AD \cdot OD = BD \cdot CD$, $BE \cdot OE = AE \cdot CE$, and $CF \cdot OF = BF \cdot AF$.

12. If H be the foot of the perpendicular from the vertex on the base of a triangle, G the point where the bisector of the vertical angle cuts the base, and D the middle point of the base, prove that the rectangle $DG \cdot DH$ is equal to the square of half the difference of the sides of the triangle.

MR. PANTON.

13. If two chords AB and CD of a circle cut at right angles at a point O , prove that—

(a). The sum of the squares of OA , OB , OC , OD is equal to the square of the diameter.

(β). The sum of the arcs AC , BD , or of the arcs AD , BC , is equal to the semi-circumference.

14. Draw a common tangent to two given circles.

If the circles touch, prove that the distance intercepted on the common tangent between the points of contact is a mean proportional between the diameters.

15. The hypotenuse of a right-angled triangle is 12.5, and the sum of the sides containing the right angle is 17.5; calculate the radius of the inscribed circle.

16. Two numbers are in the duplicate ratio of 2 to 3, and the sum of their squares is 388; find them.

17. If $y + z - x = 2a$, $z + x - y = 2b$, $x + y - z = 2c$, find the value of $(x + y + z)^3 - 8(x + a)(y + b)(z + c)$.

18. Solve the equation

$$\sqrt[3]{x^3 - a^3} = x - b.$$

Classics.

EURIPIDES.

MR. MAHAPFY.

Translate the following passages:—

1. *Beginning*, πρῶτον μὲν Διὸς ἄλσος, κ. τ. λ.
Ending, 'Αναύρου παρὰ πηγᾶς.
2. *Beginning*, ὦ τύχα, κ. τ. λ.
Ending, πῆδημ' ἐς 'Αἶδου κραιπνὸν ὀρμήσασά μοι.
3. *Beginning*, σὺ δὲ θεοῖσιν, ὡς περισσος ὢν ἀνὴρ, κ. τ. λ.
Ending, ἐπεὶ γ' ἐλήφθης.
4. *Beginning*, ἤμος ἐκ δειπνῶν ὑπνός ἦδ' ὅς ἐπ' ὀσσοῖς, κ. τ. λ.
Ending, ἀνὰ δὲ κέλαδος ἔμολε πόλιν.

1. Give some account of the extant MSS. of Euripides.
2. What other aids have we for emending the text of his plays?
3. Consider Aristophanes' allegation of his harsh treatment of women.
4. Compare the ethical aspects of ancient and modern poetry.
5. What remarkable contrast is there between Greek and modern tragedy in the treatment of historical characters?
6. How far can the opinions of Euripides be gathered from his plays?

7. What species of modern drama approaches most closely in form to Greek tragedy, and why?

8. Which of Euripides' plays are remarkable for political allusions?

9. Comment on the following passages:—

(a) πόθεν θράσος ἢ φρενὸς ἢ
χειρί, τικνον, σέθεν
καρδίᾳ τε λήψει,
δεινὰν προσάγουσα τόλμαν;

(β) οἶδα γὰρ πολλοὺς βρότων
σεμνοῦς γεγῶτας, τοῦς μὲν ὀμμάτων ἄπο,
τοῦς δ' ἐν θυραίοις.

HORACE AND OVID.

MR. POOLE.

Translate the following passages into English prose:—

- Beginning*, Hos potius populos in dotem, ambage remissa,
Ending, Quod crimen dicis, praeter amasse, meum?
- Beginning*, At bene nupta feror, quia nominer Herculis uxor,
Ending, speque timor dubia, speque timore cadit.
- Beginning*, Territus exurgis: fugit omnis inertia somni.
Ending, nec, modo formosam, posse placere Iovi.
- Beginning*, Haud procul hinc stagnum est; tellus habitabilis olim;
Ending, nutrit; et ad flammas anima perducit anili.
- Beginning*, Nos manet Oceanus circumvagus arva beata;
Ending, Laboriosa nec cohors Ulyssaei.

1. What other authors composed poems of the same nature as the *Heroides*? Ovid has been supposed to claim to be the original author of such compositions?

2. Quote some passages from the *Odes* of Horace which show a political object, and characterise him as a Court Poet?

3. What special circumstances caused Mithridates to renew the war after his defeats by Sulla; and from what quarters might he expect help?

4. What important office was renewed in the person of Agrippa by Augustus; and what were its functions?

5. What methods were adopted by Augustus for influencing the legislation and judicial administration of the State?

6. To what sources does Merivale trace the decay and instability of Roman institutions previous to the Empire; and what modern State does he compare with Rome in these respects?

7. (a) What objection does Mr. Palmer make to the reading "*hancque loco regia*," in line 4 of the first passage; and what reading does Madvig propose for lines 11, 12, and what would its force be?

(b) The introduction of mention of Io in the third passage is not unnatural?

8. (a) *quum minor e pueris, jussus studioque videndi,
Constitit ad geminae limina prima foris.*

How does Mr. Palmer argue in favour of his reading—"cum clamore Pheres," in the first line?

(b) *Expectem pelago vela negateta.*

How does Mr. Palmer correct this, and how does he account for the corrupt reading?

9. State some of the circumstances which afford peculiar facilities for the correction of the text of Ovid when corrupted.

MR. ABBOTT.

Translate the following into Greek Prose:—

In this strait for want of men, and neither time nor place for recruiting, Judas kept up his heart still to a resolution, in despite of all difficulties, of putting it to the fate of a battle; only desiring his men to stand by him, and follow his example. They told him how vain and rash a thing it would be to contend with such insuperable odds; advising him rather to attempt an honourable retreat, by which means possibly he might reinforce himself. "No, no," says he, "it shall never be said that the sun ever saw Judas turn his back upon an enemy. If it should be our lot now to die, God's will be done, provided that we do not blast the reputation of a glorious life with an ignominious death." With these words he raised the courage of his soldiers up to his own pitch, and fortified them for the combat.

Translate the following into Latin Prose:—

The great partiality of that historian for his own nation, and the unaccountable hatred he bore all those nations who bravely opposed the Roman tyranny and ambition, have frequently rendered him inconsistent with himself. This will most evidently appear to all who read his history with proper attention. Nay, this is abundantly clear, from the history we are now upon. For what sober and rational person can suppose a few raw and undisciplined young men, newly raised, capable of almost instantly dispersing very numerous armies of bold and resolute men, not unacquainted with the art of war? How can it be imagined that Etruria should have been plundered, stript of its inhabitants, exhausted, and frequently brought upon the verge of ruin, for four hundred years together, by an upstart people, who, for some time, were little better than a gang of robbers, and still to have remained, almost throughout this period, in a flourishing condition?

Translate the following into Latin Verse :—

Oh ! halcyon Youth, delightful hours,
 When not a cloud of sorrow lowers ;
 When every moment wings its flight,
 To waft new joy and new delight.
 Kind, unsuspecting, and sincere,
 Youth knows no pang, no jealous fear ;
 And sprightly Health, with cherub face,
 Enlivens ev'ry opening grace ;
 And laughing Pleasure hovers near,
 And tranquil Peace to youth is dear.
 If Sorrow heave the little breast,
 There plaintive sorrow cannot rest ;
 For swiftly flies the transient pain,
 And Pleasure re-assumes her reign.
 The tale the sons of woe impart,
 Vibrates upon the youthful heart ;
 The soul is open to belief,
 And Pity flies to soften grief.

Translate the following into Greek Verse :—

Cæs. I could be well moved, if I were as you ;
 If I could pray to move, prayers would move me ;
 But I am constant as the northern star,
 Of whose true-fixed and resting quality
 There is no fellow in the firmament.
 The skies are painted with unnumbered sparks,
 They are all fire, and every one doth shine ;
 But there 's but one in all doth hold his place :
 So, in the world : 'Tis furnished well with men,
 And men are flesh and blood, and apprehensive ;
 Yet, in the number, I do know but one
 That unassailable holds on his rank,
 Unshaked of motion : and, that I am he,
 Let me a little show it,—even in this,
 That I was constant Cimber should be banished,
 And constant do remain to keep him so.

SCHOLARSHIP EXAMINATION.

Science Scholarships.

Examiners.

JOHN LEWIS MOORE, D. D., Vice-Provost.

ANDREW SEARLE HART, LL. D.

JOHN H. JELLETT, B. D.

MICHAEL ROBERTS, M. A., Erasmus Smith Professor of Mathematics.

RICHARD TOWNSEND, M. A., Professor of Natural Philosophy.

JOHN R. LESLIE, M. A., Professor of Experimental Philosophy.

GEOMETRY.

DR. HART.

1. If from two given points on the asymptote of a hyperbola lines are drawn to intersect on the curve, what constant relation is there between the points where they meet the curve again?
2. Find the area of the triangle contained by the polars of the middle points of the sides of a given triangle with regard to an inscribed conic.
3. Find the equation of a parabola having contact of the third order with a given conic at a given point.
4. If two given conics have contact of the third order, and if chords of one touch the other, find the locus of the harmonic conjugate of the point of contact.
5. If $\alpha = 0$, $\beta = 0$, $\gamma = 0$ are the equations of the sides of the triangle ABC , prove that the point of contact of the inscribed circle with the circle which bisects the sides is given by the equations

$$\alpha = \sin^2 \frac{1}{2} (B - C),$$

$$\beta = \sin^2 \frac{1}{2} (C - A),$$

$$\gamma = \sin^2 \frac{1}{2} (A - B).$$

6. If chords of a conic cut one another at a given point, what constant relation is there between the angles subtended by their segments at a focus?
7. If the equation $(x \cos \alpha + y \cos \beta - p)^2 = mx^2 + ny^2$ represents a circle (the angle of ordination being $\alpha + \beta$): find the centre of this circle by a simple construction.
8. If a chord of an ellipse touches a given confocal conic, state a constant relation between its length and that of a parallel diameter.

9. Find the envelope of chords of a conic which subtend a constant angle at a given point on the curve.

10. If a system of circles cut two given circles at given angles, find the equation of a circle which touches every circle of the system.

11. Show how to express the equation of a circle which touches three given circles in terms of the lengths of their common tangents.

12. Prove that the locus of the intersection of tangents to a conic, which cut at right angles, cuts at right angles every circle which circumscribes a triangle self-conjugate with regard to the conic.

MR. M. ROBERTS.

1. Eliminate x, y, z between the equations

$$\begin{aligned} p &= x + y + z, \\ q &= x + \omega y + \omega^2 z, \\ r &= x + \omega^2 y + \omega z, \\ x^3 - 4yz &= 0, \end{aligned}$$

where ω is an imaginary cube root of unity.

2. Eliminate d, e between the equations

$$\begin{aligned} ace + 2bcd - ad^2 - eb^2 - c^3 &= 0, \\ ae - 4bd + 3c^2 &= 0, \\ a^2d + 2b^3 - 3abc &= 0. \end{aligned}$$

3. If $\tan \phi' = \frac{(1+m)\tan \phi}{1-m\tan^2 \phi}$, $\tan \phi'' = \frac{(1-m)\tan \phi}{1+m\tan^2 \phi}$, find an expression for m in terms of ϕ', ϕ'' .

4. If the discriminant of $ax^4 + 4bx^3 + 6cx^2 + 4dx + e$ be arranged according to powers of e in the form

$$Ae^3 + 3Be^2 + 3Ce + D, \quad (a)$$

prove that

$$\begin{aligned} A^3 D^3 - 6ABCD + 4B^3 D + 4AC^3 - 3B^2 C^2 &= \\ -729(a^3 d + 2b^3 - 3abc)^2 (a^2 d^2 - 6abcd + 4b^3 d + 4ac^3 - 3b^2 c^2)^3. \end{aligned}$$

5. If $H = b^3 - ac$, $\Delta = a^2 d^3 - 6abcd + 4b^3 d + 4ac^3 - 3b^2 c^2$, prove that the discriminant of

$$a^3 t^3 - 27H^3 t^2 + 54H\Delta t - 27\Delta^3$$

is equal to $a^3 \times$ discriminant of equation (a) in last question.

6. If $I = ae - 4bd + 3c^2$, $J = ace + 2bcd - ad^2 - eb^2 - c^3$, and if λ, μ, ν are the roots of

$$y^3 - \frac{I}{4a^3}y + \frac{J}{4a^3} = 0,$$

prove that

$$64(c - a\lambda)(c - a\mu)(c - a\nu) = a^3(a + \beta)(a + \gamma)(a + \delta)(\beta + \gamma)(\beta + \delta)(\gamma + \delta)$$

where $\alpha, \beta, \gamma, \delta$ are the roots of

$$ax^4 + 4bx^3 + 6cx^2 + 4dx + e = 0.$$

7. Eliminate u, v, w between the equations

$$\frac{x}{u} + \frac{y}{u-b} + \frac{z}{u-c} = 1,$$

$$\frac{x}{v} + \frac{y}{v-b} - \frac{z}{c-v} = 1,$$

$$\frac{x}{w} - \frac{y}{b-w} - \frac{z}{c-w} = 1,$$

$$uw = bc.$$

8. If α, β, γ are the roots of

$$ax^3 + 3bx^2 + 3cx + d = 0,$$

find in terms of the coefficients $\Sigma (a\alpha + b)^2 (\beta - \gamma)^2$.

1. If $u = \log \frac{(x-1)^2}{x^2+1} - \frac{1}{x-1}$, find $\frac{du}{dx}$.

2. If $u = \cos^{-1} \frac{b + a \cos x}{a + b \cos x}$ ($a > b$), find the value of

$$\sqrt{a^2 - b^2} \frac{d^2u}{dx^2} - b \sin x \left(\frac{du}{dx} \right)^2.$$

3. Find the value of $\int \frac{x^2 + x + 3}{x^3 - 3x - 2} dx$.

4. Find the relation between α, β, γ so that

$$\int \frac{\alpha + \beta x^2 + \gamma x^4}{\sqrt{1-x^2}} dx$$

may not depend on circular arcs: employing only the evident principle that in this case the integral must be of the form $R \sqrt{1-x^2}$, where R is a rational and integral function of x .

5. If a curve is given by the system

$$2x = \sqrt{t^2 + 2t} + \sqrt{t^2 - 2t},$$

$$2y = \sqrt{t^2 + 2t} - \sqrt{t^2 - 2t},$$

find the radius of curvature at any point in terms of t .

6. Find the value of

$$\int_x^{\frac{\pi}{2}} \sqrt{\frac{-\sin 3x}{\sin^3 x}} dx.$$

7. Show that $\int_{\frac{\pi}{2}}^{\frac{3\pi}{2}} \sqrt{\frac{-\sin 3x}{\sin^3 x}} dx$ represents the area of a circle, and find the radius.

8. If $y^4 + xy = 1$, prove that

$$y^2 \frac{d^2 y}{dx^2} + 3x \frac{dy^2}{dx^2} + y \frac{dy^2}{dx^2} = 0.$$

9. If $\phi x = (x - \alpha)(x - \beta)(x - \gamma)$, and if $\phi'x$ denotes the derived function of $\phi(x)$, find the value of

$$\frac{d}{d\alpha} \cdot \frac{\alpha^4}{(\phi'\alpha)^2} + \frac{d}{d\beta} \cdot \frac{\beta^4}{(\phi'\beta)^2} + \frac{d}{d\gamma} \cdot \frac{\gamma^4}{(\phi'\gamma)^2}.$$

ASTRONOMY.

MR. TOWNSEND.

1. Given the latitudes λ_1 and λ_2 , and the difference of the longitudes α , of two places on the surface of the Earth, supposed a sphere of radius r ; determine, for a ship taking the path of uniform course between them, the direction θ of her course, and the length l of her path.

2. A material particle, projected in the plane of the meridian at any point of the Earth's surface, being supposed to complete its trajectory under the action of gravity, and return to the horizontal plane passing through the point of projection; given all particulars, calculate its terminal deviation from the original meridian due to terrestrial rotation.

3. The three ordinary errors, in azimuth, level, and collimation, and no others, being supposed to coexist in a transit telescope; investigate, in terms of them and known quantities, the difference between the true and apparent times of transit of a known star, as observed through it at a given latitude.

4. Determine the polar distance of a celestial body, in order that, in its apparent diurnal path in the heavens, it may pass from either of two given altitudes to the other in the least possible time.

5. In determining the latitude by simultaneous observations of the altitudes of two known stars, show clearly what pairs of stars should, when possible, be selected for observation, and why.

6. The face of an ordinary dial being supposed inclined at any angles to the meridian and horizon of its place of fixture, determine the positions on it of the two hour lines for which the angular velocities of the shadow of the style are respectively greatest and least.

7. Show that the differences between the true and apparent latitudes, and between the true and apparent longitudes, of a star, caused by its annual parallax and by its aberration combined, vanish and are maxima each twice a year; the evanescence of either synchronizing with the maximum of the other, and conversely.

8. Determine the locus of those stars in the heavens which, for a given position of the Earth in her orbit, experience no change in declination from the two aforesaid causes combined.

9. Show accurately how to determine, for a given day, the hour angle and time corresponding to the greatest altitude of the Moon above the horizon of a given place.

10. Given the horizontal parallaxes h_1 and h_2 , and the apparent semi-diameters s_1 and s_2 , of the Sun and Moon, at the commencement (or termination) of a solar or lunar eclipse; express in terms of them, for each case, the corresponding angular distance between the centres of the two bodies.

11. Investigate, generally, the equations for the determination of the arguments of latitude of two planets in their positions of stationary appearance from each other; all particulars of their orbits, supposed eccentric and inclined, being supposed given.

12. At noon, Greenwich mean time, on Jan. 1, 2, 3, 4, A. D. 1871, the heliocentric longitudes of Mercury, as given in the Nautical Almanac for the year, were $17^{\circ} 31' 15''$ 3, $23^{\circ} 2' 40''$ 7, $28^{\circ} 36' 58''$ 4, $34^{\circ} 19' 48''$ 4, respectively; find, by interpolation, their values at the three intermediate midnights.

MR. JELLETT.

1. One end of a beam rests upon a horizontal plane so rough as to prevent all slipping; a cord attached to the other end passing over a pulley sustains a weight. If the system be in equilibrium, find the locus of the position of the pulley so that the tension on the cord may be the least possible, the position of the beam being given.

2. A beam is laid upon a smooth inclined plane, and is supported by a string attached at both ends to the beam, and passing through a small smooth ring situated on the plane. If the position of the ring, the points of attachment, and the length of the string be given, determine the position of the beam.

3. It is required to support a wheel upon a smooth inclined plane by means of a string coiled round the wheel, and attached to a fixed point.

(a). Show that this is impossible if the centre of gravity of the wheel be also its centre of figure.

(b). If the centre of gravity be not the centre of figure, show how to adjust the wheel and string so that the inclination of the plane may be the greatest possible.

(c). If r be the radius of the wheel, and d the distance of the centre of gravity from the centre of figure, show that the greatest inclination of the plane consistent with equilibrium is given by the equation

$$\sin. \text{incl.} = \frac{d}{r}.$$

(d). If the plane be rough, the centre of gravity coinciding with the centre of figure, show that the maximum inclination is attained when

$$p$$

the cord is horizontal, and that the value of this inclination is given by the equation

$$\tan \frac{1}{2} \text{ incl.} = \text{coef. of friction.}$$

4. A beam resting on the ground, and against a wall, both being smooth, is to be raised to a higher position by a force applied at a given point on the beam. Show that the direction of the least force which will in any position of the beam cause it to move upwards, is found by drawing a tangent to an ellipse whose centre is at the foot of the wall, and whose axes (horizontal and vertical) are the segments into which the beam is divided by the point of application of the force.

5. An ellipse is placed with its major axis vertical : find the right line of quickest descent from the upper focus to the curve.

(a). Whatever the curve be, if the vertical radius vector be perpendicular to the tangent at its extremity, the time of descent down this radius vector must be either a maximum or a minimum.

6. A particle is acted on by two forces, viz.,

i. Gravity.

ii. A central attracting force varying directly as the distance.

Show that it will describe an ellipse.

EXPERIMENTAL PHYSICS.

MR. LESLIE.

1. Determine the true height of a barometer from the following observation :—

Barometer reading, . . .	29.409 ⁱⁿ .
Attached thermometer, . . .	54°.3 F.
Corr. for capacity, . . .	-.017.
Corr. for capillarity, . . .	+.032.
Neutral point, . . .	30.123.

How are the corrections made (a) for the expansion of the scale, (b) for latitude and height above the sea-level ?

2. Describe Gay-Lussac's method of finding the density of a vapour, and deduce the formula from which the density is calculated.

3. State Dumas' method of determining vapour density, and show how the value of the density is obtained.

4. Give the details of Regnault's method of finding the expansion of gases by heat.

5. Give the calculations necessary for finding specific heats (a) by mixtures, (b) by cooling, (c) by Bunsen's ice-calorimeter

6. Describe the methods which have been used to determine the mechanical equivalent of heat, and show how it is connected with the specific heats of air.

7. Give Dulong's method of determining the law of cooling, and show that Newton's law is only approximate.

8. Deduce the general formulæ for ascertaining the increase of temperature produced by the combustion of any kind of fuel.

9. Give the details of Holtz' electrical machine, and explain the principle of its action.

10. Describe the construction of Clarke's magneto-electrical machine, and give the theory of its action.

11. State the modifications which have been introduced in magneto-electrical machines by Siemens, Wild, and Gramme.

12. In Ruhmkroff's coil the discharges are obtained *in a single direction only*; show how this is explained by what is known as the *extra-current*.

Give any method of demonstrating the existence of extra currents.

13. Show how galvanic resistances may be compared (*a*) by means of a rheostat or resistance coils, (*b*) by Wheatstone's bridge.

14. How is the internal resistance of a battery found by experiment? State the method of finding the resistance of an *inconstant cell*.

15. Explain the *compensation method* of comparing electro-motive forces.

16. Explain the mode of finding experimentally the moment of inertia of a bar magnet.

17. Describe the mode of finding the magnetic dip. Show that it may be found by observations made out of the magnetic meridian.

18. Describe the construction of the electro-dynamometer, and state the mode of using it.

DR. MOORE.

1. State the distinction between hypothetical and categorical propositions, and whence the hypothetical derives its logical importance?

2. The distinction between nominal and real definition is, Mr. Mill considers, untenable; what does he state to be the true state of the case?

3. Discuss Professor Stewart's theory as to the office of axioms and definitions in geometrical demonstration.

4. Dr. Whately's account of the position of syllogism in the philosophy of reasoning is erroneous.

5. Mr. Mansel states that Reid corrected Locke's theory of sensation; explain this, and give Sir W. Hamilton's rule as to the relation of a sensation and its perception.

6. How far did Locke advance the theory of our acquired perceptions? What are the peculiar difficulties to the analysis of touch?

7. Mansel states that two states of consciousness connect the external and internal affections of our nature; explain this, and discuss the office of attention between sensation and perception.

8. Condillac's assertion that sensation furnishes the whole material of our knowledge, is not a legitimate inference from Locke's theory of Reflection?

9. What is Mansel's definition of Imagination, and how does he establish it?

10. Write out the laws of definition and division, and give examples of their violation in Murray's logic.

Classics.

Examiners.

JOSEPH CARSON, D. D.

THOMAS STACK, M. A.

WILLIAM ROBERTS, M. A.

JOHN KELLS INGRAM, LL. D., Regius Professor of Greek.

ROBERT Y. TYRRELL, M. A., Professor of Latin.

MR. STACK.

Translate the following passages accurately into English :—

1. *Beginning*, οὕτε γὰρ οἱ πῖλοι ἔστεγον τὰ τοξεύματα, κ. τ. λ.

Ending, ἰδόντας πολλῶ μᾶλλον ἐπέρρωσε.

THUCYDIDES, iv. 34-36.

2. *Beginning*, Εἰσι δὲ αἱ μὲν πολιτικαὶ τῶν ἐπιμελειῶν κ. τ. λ.

Ending, ἡ παιδων ἄλλον καὶ γυναικῶν.

ARISTOTLE, *Politics*, iv. 12.

3. *Beginning*, Οὐκοῦν καὶ τελευτῶντες, ἐπιδὼν ὁρῶσι, κ. τ. λ.

Ending, τύραννος ἀπειργασμένος κατέρχεται; Δῆλον.

PLATO, *De Republica*, viii. 16.

4. *Beginning*, ἀλλ' ὥς μὲν ὦφλεν, ἐνεβάλετο τηρήσας, κ. τ. λ.

Ending, ταύτην δ' οὐκ ἐσημήναντο, οὐδ' αὐτὴν ἀπέδосαν.

DEMOSTHENES, *Κατὰ Αφοβου*, β. 1-6.

MR. W. ROBERTS.

Translate the following passages :—

1. *Beginning*, ΟΡ. λίγοιμ' ἂν ἀρχαὶ δ' αἶδε μοι πολλῶν πόνων, κ. τ. λ.

Ending, χοῆρες ἄγγοι Παλλάδος τιμᾶν λεῶν.

EURIPIDES, *Iphigenia in Tauris*, 939-960.

2. *Beginning*, ΕΡ. λίγων ἔοικα πολλὰ καὶ μάτην ἐρεῖν κ. τ. λ.

Ending, κλεινὸν βρωτον δ' ἤπαρ ἐκθονήσεται.

ÆSCHYLUS, *Prometheus Chained*, 1007-1025.

3. *Beginning*, ὦ πόποι, ἡ μάλα δὴ κρατερὸφρονος ἀνδρὸς ἐν εὐνῇ,
κ. τ. λ.

Ending, Οἱ καὶ μιν πέμπουσιν ἐπ' εὐρία νῶτα θαλάσσης.

HOMER, *Odyssea*, lib. xvii. 124-146.

4. *Beginning*, ἡ ἄρα δὴ μάλα πάντες ἀμαρτίνοσι πελόμεσθα, κ. τ. λ.

Ending, Ζην' θεῶν κρείοντι, Δίκη τ' ἐπίηρα φέρουσα.

RHIANUS.

DR. INGRAM.

Translate the following passages :—

1. *Beginning*, In foro L. Antonii statuam videmus,

Ending, L. Antonio mille nummum ferret expensum ?

CICERO, *Philipp.*, vi. 5.

2. *Beginning*, Ain tu ? an me existimas ab ullo malle mea

Ending, constrictione et sillybis. Eos velim laudes.

CICERO, *Ad Att.*, iv. 5.

3. *Beginning*, Hae Siculorum querelae . . . in senatum etiam

Ending, prosperis tum maxime bellicis rebus, caderet.

LIVY, xxvi. 29.

4. *Beginning*, Sed Nero, " nihil ambitu nec potestate senatus

Ending, alacritatem tristitiamque coeuntium, scrutarentur.

TACITUS, *Ann.*, xvi. 4.

MR. TYRRELL.

Translate the following passages :—

1. *Beginning*, Senem, quod omnes rideant, adulterum

Ending, Nulla expiatur victima.

HORACE, *Epod.*, 57-90.

2. *Beginning*, Curate ut splendor meo sit clypeo clarior,

Ending, Perque os elephanti brachium transmitteres.

PLAUTUS, *Milus Gloriosus*, act i. sc. 1.

3. *Beginning*, Nunc totus Graias nostrasque habet orbis Athenas

Ending, Ora puellares faciunt incerta capilli.

JUVENAL, *Sat.* xv. 110-137.

4. *Beginning*, Hunc ego, iuvenes, locum, villulamque palustrem,

Ending, Inde sumite : semita haec deinde vos feret ipsa.

CATULLUS, *Carminum*, xix.

5. *Beginning*, Quod tibi malueram, sine me debere procellis :

Ending, Quaeque cadent in te fulmina missa putes ?

OVID, *Heroides*, vii. 43-72.

MR. W. ROBERTS.

Translate the following passage into Greek Prose ; appending an *ordo verborum* of your rendering, as well as a literal Latin translation of it :—

It is with a heart penetrated with grief, that I rise to reply to accusations, the absurdity of which is only equalled by their malignity, at a time when the dangers of our country require all our united efforts. Granted that we strove to moderate the movement of August, which, ill-directed, might have led to a regency, or a new sovereign, are we, on this account, enemies to liberty ? Did we not propose a republic in lieu of that monarchy under which France groaned for so many centuries ? Did we not deprive the king of his power amid the din of that popular rising ? Robespierre, of course, knew nothing of all this, for he prudently hid himself in a cellar during the entire conflict. When the father was suspended from all authority, was there anything hostile to liberty in appointing a preceptor for his son, to preserve him from the courtly ideas he might otherwise have imbibed ? The thing is too ridiculous to require a serious answer.

 MR. STACK.

Translate the following into Latin Prose :—

At the moment when Cæsar descended from his litter at the door of the hall, Popilius Lænas approached him, and was observed to enter into earnest conversation with him. The conspirators regarded one another, and mutually revealed their despair with a glance. Cassius and others were grasping their daggers beneath their robes ; their last resource was to despatch themselves. But Brutus, observing that the manner of Popilius was that of one supplicating rather than warning, restored his companions' confidence with a smile. Cæsar entered : his enemies closed in a dense mass around him, and while they led him to his chair kept off all intruders. Trebonius was specially charged to detain Antonius in conversation at the door. Scarcely was the victim seated when Tillius Cimber approached with a petition for his brother's pardon. The others, as was concerted, joined in the supplication, grasping his hands and embracing his neck. Cæsar at first put them gently aside, but, as they became more importunate, repelled them with main force. Tillius seized his toga with both hands, and pulled it violently over his arms. Then P. Casca, who was behind, drew a weapon and grazed his shoulder with an ill-directed stroke. Cæsar disengaged one hand, and snatched at the hilt, shouting, *Cursed Casca, what means this ? Help*, cried Casca to his brother Lucius, and at the same moment the others aimed each his dagger at the devoted object. Cæsar for an instant defended himself, and even wounded one of the assailants with his stylus ; but when he distinguished Brutus in the press, and saw the steel flashing in his hand also, *What ! thou too, Brutus !* he exclaimed, let go his hold of Casca, and, drawing his robe over his face, made no further resistance. The assassins stabbed him through and through, for they had pledged themselves, one and all,

to bathe their daggers in his blood. Brutus himself received a wound in their eagerness and trepidation. The victim reeled a few paces, propped by the blows he received on every side, till he fell dead at the foot of Pompeius' statue.—MERIVALE.

MR. TYRRELL.

LATIN VERSE.

The minstrel waked his harp—three times
Arose the well-known martial chimes,
And thrice their high heroic pride
In melancholy murmur died.
“Vainly thou bidst, O noble maid !”
Clasping his withered hands, he said,
“Vainly thou bidst me wake the strain,
Though all unwont to bid in vain.
Alas ! than mine a mightier hand
Has tuned my harp, my strings has spanned ;
I touch the chords of joy, but low
And mournful answer notes of woe ;
And the proud march which victors tread,
Sinks in the wailing for the dead.
O well for me, if mine alone
That dirge's deep prophetic tone !”

GREEK VERSE.

Fear not ; thou shalt be guarded till my death .
Howbeit I know, if ancient prophecies
Have erred not, that I march to meet my doom.
Thou hast not made my life so sweet to me,
That I the King should greatly care to live ;
For thou hast spoilt the purpose of my life.
But think not, tho' thou would'st not love thy lord,
Thy lord has wholly lost his love for thee :
I am not made of so slight elements.
Yet must I leave thee, woman, to thy shame.
I hold that man the worst of public foes
Who either for his own or children's sake,
To save his blood from scandal, lets the wife
Whom he knows false, abide and rule the house :
For being thro' his cowardice allowed
Her station, taken everywhere for pure,
She like a new disease, unknown to men,
Creeps, no precaution used, among the crowd,
Makes wicked lightnings of her eyes, and saps
The fealty of our friends.

MR. W. ROBERTS.

1. Give an account of the origin and some of the principal incidents of the Messenian wars.
2. Write an account of the lesser Ampiktyonics, and mention some considerations which establish the very high antiquity of the Amphiktyonic Convocation.
3. Give an outline of the political constitution of Sparta ascribed to Lycurgus.
4. Give an account of the military operations of the Romans in Germany from the Varian defeat to the final withdrawal of their frontier behind the Rhine.
5. Write a sketch of the foreign policy of Augustus.
6. Trace some of the causes of the decline of the Roman Empire.

DR. INGRAM AND MR. TYRRELL.

1. Write down the Greek words corresponding to the following: spondee, trochee, choree, theme, proem, prosody, prosodiac (verse), parody, parodos (in the Greek Drama), trophy.
2. What is the fact respecting Greek composition to which such a word as *hemorrhage* is due? Criticize the form of the word *idolatry*. The Latin *nutrix* and *stipendium* are instances of the same thing?
3. What are the meanings and derivations of the Latin words from which the following have come: futile, interpolate, plagiarist, prestige, prevaricate?
4. By what Latin words are the following to be rendered:—ἀποτρόπαιος, βίος ἀβίωτος, ἱφιδρος, ἡμιόλιος, καλλιερεῖν, κτήρεα (or κτερίσματα), νεωκόρος?
5. Write an account of a gladiatorial contest at Rome under the Empire, discussing fully the meaning of the phrases *pollice verso*, *pollice presso*, *pollice utroque*.
6. a. Describe the ancient chariot. Can you recall any remarkable features in the description of the chariot-race in Il. xxiii.?
b. What are the Greek and Latin terms for the axle, the spokes, the tire, the pole?
7. a. Write a note on the uses of the prepositions *a* (*ab*), *abs*, *absque*, *prae*, *ob*, *versus*, *clam*.
b. How would you express in Latin and in Greek *With whom shall I begin?*
8. Point out anything which seems specially noteworthy in the following passages:—

a. νύμφας δ' ἐκ θαλάμων . . .

ἡγίνειον ἀνὰ ἄστν, πολὺς δ' ὑμέναιος ὁρώρει.

Il. σ. 493.

- b. κρημνοὶ γὰρ ἐπηρεφεῖς περὶ πᾶσαν [τάφρον]
ἔστασαν ἀμφοτέρωθεν, ὑπερθεὶν δὲ σκολόπεσσιν
ὀξίσιν ἡρήρει τοὺς ἔστασαν νῆες Ἀχαιῶν. *Ib.* μ. 54.
- c. ἃ σοὶ τὲ κἄμιοι κἀλ' ὁρῶ τελούμενα. *Soph. Phil.* 1381.
- d. ὕβρις φυντεύει τύραννον,
ὕβρις, εἰ πολλῶν ὑπερπλησθῆ μάταν, ἃ μὴ 'πίκαιρα
μηδὲ συμφέροντα. *O. T.* 874.
- e. ἡ δ' οἴκοι πλείον
δίcky σίβοιτ' ἄν, οὔσα σὴ πάλαι τροφός. *O. C.* 759.
- f. οἴκουν ποτ' ἐκ τούτοις γε μὴ σκήπτροισιν ἔτι
ἡδοικότησις. *Ib.* 848.
- g. καὶ τούτου μὲν πάντα καὶ μετὰ τούτου ὠνούμενά τε καὶ
πιπρασκόμενα. *Plat. Phaed.* 69 B.
- h. τὸ τὰ λεγόμενα περὶ αὐτῶν μὴ οὐχὶ παντὶ τρόπῳ ἐλέγχειν
... πάννυ μαλθακοῦ εἶναι ἀνδρός. *Ib.* 850.
- i. ὁ δ' ἄρα ᾧ παιδί ὅπασσε
γηράς, ἀλλ' οὐχ υἱός ἐν ἔντεσι πατρὸς ἐγήρα. *Hom. Il.* 196.
- j. τοιοῦτον, οἷον κἀμὲ γηρᾶναι ποτί. *Soph. O. C.* 870.

The verb in (j) is by some written γηράναι, by others γηρᾶναι. Explain both forms. The aor. ἐγήρασα is found in two different senses? What are γηράς and ἐγήρα in (i)?

9. Why and how have the following passages been altered by editors? Where different corrections have been proposed, discuss their comparative merits.

- a. ἐς μάχην ἐλθεῖν ἐτόλμησ' ἥσυχος δ' ἐκ βάκχας ἄγων
δωμάτων ἦκω πρὸς ὑμᾶς Πενθείως οὐ φροντίσας. *Bacch.* 636.
- b. μαίνεσθε χειρῶν τοῦδ' ἐν ἄρκυσιν γὰρ ὦν
οὐκ ἔστιν οὕτως ὥκδς ὥστε μ' ἐκφυγεῖν. *Ib.* 451.
- c. τίς σ' ἔτικτε
τῶν μακραιώνων ἄρα, Πανδὸς ὀρεσσιβάταο
προσπελασθεῖς, ἡ σὲ γὰρ τις θυγάτηρ
Δοξίου; *O. T.* 1100.
- d. οἶος νεαρᾶς νεόποκφ μαλλῶ λαβών. *O. C.* 475.
- e. ἐν οἷς γὰρ
χάρις ἡ χθονία ξυναπόκειται
πενθεῖν οὐ χρῆ. *Ib.* 1751.
- f. τί δὴ ποθ' ὦδ' ἐξ οὐδενὸς
λόγου σιωπᾶς, κἀπόπληκτως ὦδ' ἔχει; *Phil.* 731.

10. Write a note on the following passages from Horace:—

- a. pugna *super* mero
Debellata.

- b. Pallida mors *aequo* pulsat *pede* pauperum tabernas
Regumque turres.
- c. nec malis
Divolsus querimoniis
Suprema citius solvet *Amer die*.
- d. *Sublimi* fugies mollis anhelitu.
- e. Voltus nimium lubricus aspici.
- f. Thure te multo Glycerae decoram
Transfer in *aedem*.
- g. Mihi *cumque* salve
Rite vocanti.

11. Explain the meaning, and state the metres of each of the following, marking the quantity of each syllable :—

- a. Virum mihi, Camaena, in sece versutum.
- b. Nil morantur iam Laconas, imi subcelli viros.
- c. Mastruga, halagoras hama tum autem plenior
Allii ulpicique quam Romani remiges.
- d. Item genus est lenonium inter homines meo quidem animo
Ut muscae culices cimices pedesque pulicesque.
- e. Verbum unum adde istoc : iam hercle ego te hic hac offatim
conficiam.
- f. A pileatis nona fratribus pila.

12. Point out the etymological relation between the words which form each of the following pairs : door, fores ; five, quinque ; head, caput ; tear, lacrima ; age, *αἰ* ; hundred, *ἑκατόν* ; sue, *ἔπομαι* : spite, *ἔκτρομαι*.

13. On what principles should we write *silva* not *sylva*, *caelum* not *coelum*, *caespes* not *cespes*, *litus* not *littus* ?

14. Translate into Latin and Greek, so as to introduce some idiom :—

- a. I knew that *I* was not wrong, but *you* who spoke against the proposal.
- b. She spoke loud, affecting to think him deaf as well as blind.
- c. He must have told the truth, else we should have long since found out that he was in collusion with the defendant.
- d. How small a part of those who fought survive.
- e. Let me know in reply how large a party you would wish to meet at dinner.

15. a. How might the late date of the *Bacchae* among the plays of Euripides be inferred from internal evidence ?

b. What are the distinguishing characteristics of the fourth book of the *Odes* of Horace as compared with the earlier books ?

16. What is meant by *dittography* in criticism? How does Mr. Palmer illustrate the action of this principle in the following cases :—

- a. *Troas* invideo quae sic lacrimosa suorum.
- b. Cur venit a verbis multa querella *tens*.
- c. Et dabo *cunctas* tempore victa manus.
- d. His *equidem* Phoebus visus mihi pulchrior ipso
Marmoreus tacita carmen hiare lyra.
- e. Expectem pelago vela *negateta*.

DR. INGRAM.

Subjects for Composition.

1. The development of political society in Greece.
2. Contrasts of ancient and modern life.
3. Internal evidences of one or several Homers.
4. The attitudes of Homer, Sophocles, and Euripides towards the Greek Religion.
5. Herodotus and Thucydides as Historians.
6. Plautus and Terence as Dramatists.

[Candidates will select *one* of the above subjects.]

BISHOP LAW'S MATHEMATICAL PREMIUM.

MR. M. ROBERTS.

1. Let p, q, R be rational and integral functions of x , and let

$$pq \frac{dR}{dx} + 2 \left(p \frac{dq}{dx} - q \frac{dp}{dx} \right) R = M,$$

$$p^2 - q^2 R = N,$$

prove that

$$\int \frac{M}{N} \frac{dx}{\sqrt{R}} = \log \frac{p + q \sqrt{R}}{p - q \sqrt{R}}.$$

2. Prove that the integral of the linear differential equation

$$\frac{d^2 y}{dx^2} + \cot x \frac{dy}{dx} - y \operatorname{cosec}^2 x = V,$$

where V is a function of x , is

$$y = \tan \frac{x}{2} \int V \cos^2 \frac{x}{2} dx - \cot \frac{x}{2} \int V \sin^2 \frac{x}{2} dx.$$

3. Let x_1, x_2, \dots, x_n be the roots of $f(x)$, and let $f'x, f''x$ be its first and second derived functions: prove that the symmetric function

$$\Sigma \frac{(f''x_1)^2 f'(x_2) f'(x_3) \dots f'(x_n)}{f'(x_1)}$$

is equal to the coefficient of the penultimate term of the equation of the squares of the differences of the roots, multiplied by a numerical factor.

4. Let a_0, a_1, \dots, a_n be the binomial coefficients of an equation of the n^{th} degree, and let the following expression:

$$A_0 a_n^p + p A_1 a_n^{p-1} + \frac{p \cdot p-1}{1 \cdot 2} A_2 a_n^{p-2} + \dots \quad (1)$$

denote a function of the differences of its roots, arranged according to the powers of the absolute term a_n : if δ represents the operator

$$a_0 \frac{d}{da_1} + 2a_1 \frac{d}{da_2} + \dots + na_{n-1} \frac{d}{da_n},$$

prove that $\delta A_r = -nra_{n-1} A_{r-1}$.

$$\text{If} \quad B_0 a_n^q + q B_1 a_n^{q-1} + \frac{q \cdot q-1}{1 \cdot 2} B_2 a_n^{q-2} + \dots \quad (2)$$

denotes another function of the differences of the roots, prove that the resultant of (1) and (2) is a function of the difference of the roots.

5. Let $py^2 + qy + r = 0$ be the equation of a cubic referred to a parallel to an asymptote, and let

$$u = \int \frac{dx}{\sqrt{q^2 - 4pr}} :$$

if u_1, u_2, u_3 are the values of this integral for the points where the curve is met by any right line. prove that $u_1 + u_2 + u_3$ is an absolute invariant of the curve.

Determine the geometric meaning of the roots of the biquadratic $q^2 - 4pr = 0$: what property of the cubic is indicated by the vanishing of its cubinvariant ?

6. Let a cubic and conic have a five-point contact, and let the remaining point of intersection be designated as the *conic tangential* : how many points on the cubic have the same *conic tangential* ?

ANALYTIC GEOMETRY.

MR. TOWNSEND.

1. If A, B, C be the three vertices of a triangle of any form, and A', B', C' any three collinear points on its opposite sides, show that every conic which divides any two of the three lines AA', BB', CC' harmonically, divides the third harmonically also.

2. If A, B, C, D be the four vertices of a tetrahedron of any form, and A', B', C', D' any four collinear points on its opposite faces, show that every quadric which divides any three of the four lines AA', BB', CC', DD' harmonically, divides the fourth harmonically also.

3. For a system of conics having a common system of four, or three, tangent lines, show that the system of director circles has a common radical axis, or centre.

4. For a system of quadrics having a common system of eight, seven, or six, tangent planes, show that the system of director spheres has a common radical plane, axis, or centre.

5. The equation of a central quadric surface in rectangular co-ordinates being $ax^2 + by^2 + cz^2 + 2fyz + 2gzx + 2hxy = d^2$, find that of its reciprocal with respect to the concentric sphere $x^2 + y^2 + z^2 = r^2$.

6. The equation of a non-singular cubic curve in trilinear co-ordinates being $x^3 + y^3 + z^3 + 6mxyz = 0$, find that of its reciprocal with respect to the imaginary conic $x^2 + y^2 + z^2 = 0$.

7. The equations of two conics referred to their common self-reciprocal triangle being $a_1x^2 + b_1y^2 + c_1z^2 = 0$, and $a_2x^2 + b_2y^2 + c_2z^2 = 0$, find that of the quasi-evolute of either of them with respect to the other.

8. Show that the quasi-evolute of a tricuspidal quartic curve, with respect to the extremities, real or imaginary, either of a bicuspidal or of the bitangent chord, is another tricuspidal quartic of the same species, having the same cuspidal tangents and centre with the original.

9. In any tricuspidal quartic curve, prove the harmonic section (α) of each bicuspidal chord by the tangents at the extremities of every chord

passing through the opposite cusp; (*b*) of the bitangent chord by the tangents at the extremities of every chord touching the curve.

10. Regarding a non-singular cubic, or a binodal quartic, in a plane, as the projection of a twisted quartic in space from a centre on, or not on, the curve, show, from the theory of conics, that the problem to inscribe in it a polygon of any even order whose sides shall pass alternately through the same two points on the cubic, or through the two nodes of the quartic, is always either indeterminate or impossible.

11. Two chords of a twisted quartic in space being supposed complanar, (*a*) prove the anharmonic equivalence of the two tetrads of planes passing through them, and touching the curve; (*b*) determine the form of the ruled surface generated by either of them, supposed to vary while the other remains fixed.

12. Discuss completely the singularities of the plane curve whose equation in trilinear co-ordinates is

$$x^3 + y^3 + z^3 = 0.$$

POLITICAL ECONOMY PRIZE EXAMINATION.

PROFESSOR DONNELL.

1. What is meant by the Par of Exchange? How is it ascertained between countries which have

- (*a*) the same standard;
- (*b*) different standards?

2. M. Chevalier says that, of all the European nations, Great Britain has been the most honest in the matter of the currency. Show that this is true as to France by a comparison of the successive changes in the standards of the French and English coinage respectively.

3. What classes of persons lose, and what classes gain, by a fall in the value of gold? Does the state gain on the whole?

4. Can the issue of bank notes be properly regulated by reference to the rate of interest?

5. What is meant by Free Banking? Are Free Banking and Free Trade defensible on the same principles? If not, why not?

6. Show that the landowners have most to gain by law reform. Is it true that "every imperfection of the law, in proportion as it is burdensome to the landowners, brings gain to the lawyers"?

7. Trace the economic effects of the Irish emigration. Is the rise in the rate of wages in Ireland within the last thirty years due, entirely or at all, to this cause?

8. Is the curtailment of the hours of labour of adults a proper object of state policy or of labourers' combinations?

9. Adam Smith says that "the invention of firearms is certainly favourable both to the permanency and to the extension of civilization." How does he show this?

10. What benefits did Adam Smith anticipate that Ireland would derive from union with Great Britain?

11. What plans does Adam Smith suggest for completely separating the judicial from the executive power?

12. Do patent-right and copyright stand on the same grounds?

REAL PROPERTY AND FEUDAL LAW EXAMINATION.

DR. RICHEY.

1. State the nature of a tenancy at will, how it is created, and how determined. Distinguish a tenancy at will from "conacre."

2. State the nature and incidents of a tenancy from year to year, how it is created, and how determined. State what is the presumption which arises from the fact of the payment of rent.

3. State the nature and effect of the Statute "Quia Emptores," and how far the operation of this Statute has been relaxed in Ireland.

4. State the origin, nature, and consequences of the Common Law doctrine that the rent was incident to the reversion, and how far this doctrine has been modified by the 8 & 9 Vict. cap. 106, and the 23 & 24 Vict. cap. 154.

5. Distinguish the "reservations" and the "exceptions" in a lease; and state what are the rules of law as to the working of mines, quarries, and bogs by a tenant.

6. State the respective rights of the landlord and tenant in respect of trees standing upon the demised premises (a) when trees are excepted, and (b) when they are not excepted from the premises demised.

7. State briefly the Common Law doctrine as to covenants which ran and which did not run with the land. How far has this doctrine been modified by the 23 & 24 Vict. cap. 154. State the forms of conveyances and legal remedies in use for the purpose of enforcing the performance of covenants contained in leases.

8. State the rules of the Common Law in respect of emblements, and the mode in which they have been modified by the Acts of the 23 & 24 Vict. cap. 154, and the 33 & 34 Vict. cap. 46.

9. State the rules of law as to fixtures prior to the 23 & 24 Vict. cap. 154, and the modifications thereof introduced by that Act.

10. Give a brief sketch of the origin and the development of the law in respect of "*distress*" and "*replevin*."

(Students not competing for the Prize are not required to answer the following Questions.)

11. State the origin and object of the Act of the 33 Hen. VIII. sec. i. cap. 11 (21 Hen. VIII. cap. 15, Eng.), whereby tenants for terms of years were enabled to falsify recoveries.

12. State briefly the political causes which have from time to time affected the form and nature of Irish tenancies.

13. State the distinction, as to their origin and first principles, between the English Law of Landlord and Tenant and the Civil Law; and state the causes which have gradually modified the English Law upon this subject.

14. State briefly the leading alterations in the Law of Landlord and Tenant introduced by the Act of the 23 & 24 Vict. cap. 154, and the principles upon which this Act was based.

15. State briefly the new rules as to Landlord and Tenant introduced by the Act of the 23 & 24 Vict. cap. 46, and explain its provisions upon the following subjects:—

- (a). Ulster tenant right.
- (b). Compensation for disturbance.
- (c). Compensation for improvements.
- (d). The exception of certain tenancies from the operation of the Act.

MUSICAL EXHIBITIONS.

MR. MAHAFFY.

1. Harmonize the following:—



2. Write out the remaining parts of this chant:—



3. Resolve the following chords :—



4. What are the proper parts of a full Morning Service ?

5. Write out, with accompaniment, twelve bars from any tune you remember in the *Messiah*.

6. What are the ordinary limits of each of the four voices in part singing ?

7. What revolution in piano-forte music may be said to have been effected by Mendelssohn's *Lieder ohne Worte* ?

8. What is necessarily the leading feature in vocal eight-part compositions ?

EXAMINATION FOR DOCTOR IN MUSIC.

SIR ROBERT STEWART.

1. What are the chords of the added ninth ; diminished seventh ; added sixth ; Neapolitan, French, and German sixths ; eleventh ; and thirteenth ?

2. Modulate from C through A, F sharp major, E flat, D flat, G minor, F major, G, to C.

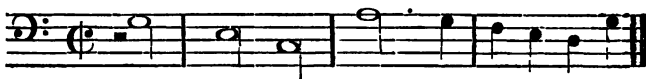
3. Add a bass and inner part to the melody of a chromatic scale descending from C# to C#, one octave.

4. Express the following figured harmonies by chords.



5. What are (briefly) the laws of Fugue ? May the pedal be ever introduced on any note save the Dominant ? Is it ever found in any part except the bass ?

6. Write a short four part fugue on the following subject.



7. What is the usual arrangement of a score of instruments? Is this ever departed from?
8. Mention an early example of a grand orchestra with four horns, &c.
9. Give an instance of the employment of the Contra fagotto, or cor Anglais, or Basset Horn, in well-known works.
10. Can you call to mind any peculiar effects produced by Beethoven's use of the Drum, and Weber's use of the Clarinet?
11. Mention some of the devices of modern orchestration.
12. One of the most popular instruments of modern times is sometimes employed with little discretion in orchestration; which is that instrument? What are its advantages, and how may its powers be turned to good account?
13. Harmonize a few bars of the National Anthem in eight real vocal parts, and full score of instruments.
14. With what orchestral instrument does Handel seem to have been unacquainted?
15. What is Temperament? Mention the names of some persons who have proposed various systems of temperament.
16. Describe "The Syren;" who invented it? When did Maelzel live? What instruments did he invent? And was he also associated with any celebrated composer?
17. Give some account of Wagner's attitude as a composer.
18. How many Symphonies did Beethoven write? Does any other modern work resemble in plan his 'choral' symphony?

MR. MAHAFFY.

1. What changes has Gounod made in his present *Faust* as compared with its original published form?
2. Cite examples from great composers of the use of a *drone* bass (like that of the bag-pipes).
3. Can you remember any two distinct melodies which can be harmonised together? Explain how it can be done.
6. How has Helmholtz accounted for the various *qualities* of tone on physical principles?
5. Describe his *vibration-microscope*.
9. What actual remnants have we of old Greek tunes?

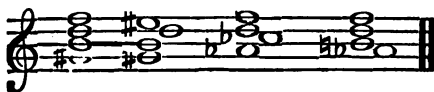
EXAMINATION FOR BACHELOR IN MUSIC.

SIR ROBERT STEWART.

1. What is a false relation?
2. What is double counterpoint, in the 8ve, 10th, 12th?
3. What is the true meaning of the term "thorough bass"?
4. Describe the ancient modes: What two choruses in Handel's "Israel" are supposed to be written in any of them?
5. Did the old masters (17th and 18th centuries) ever use different signatures from modern composers?
6. Upon what depends the pitch of musical sounds?
7. Explain the derivation of the stave and the clefs.
8. Give some of the names and values of ancient notes.
9. What are the meanings of the word "Cadence," and how many Cadences are there?
10. Various forms of the minor scale exist; explain and justify them.



11. Bar the above melody in two different ways.
12. What is the principle of time-signatures?
13. The fractions $\frac{3}{4}$ and $\frac{6}{8}$ are generally equal; why do they represent different effects to the musician?
14. What is a diatonic semitone? a chromatic semitone? What are the relative properties of perfect, augmented, and diminished intervals?
15. What are the meaning and derivation of the term *appoggiatura*? Is it employed generally at present?
16. What are the roots and resolutions of the following:—



17. Give as nearly as you can recollect, the date of birth, and death of Handel, J. S. Bach, Haydn, Mozart, Beethoven, and Mendelssohn.

18.



Treat the above Choral in four-part harmony, employing the proper clefs.

- 1st. As the melody, accompanied with florid counterpoint in one of the parts.
- 2nd. As a Tenor part.
- 3rd. As the Bass.

MR. MAHAFFY.

1. What are Gregorian tones? Give instances where they are introduced with effect by modern composers.
2. If required to add a fifth part to a simple vocal quartet, on what general principles would you proceed?
3. What examples are there of different times being used simultaneously in concerted music?
4. Compare the effects of alto and contralto voices in musical composition.

HEBREW EXAMINATION, AND THE PRIMATE'S PRIZES.

SENIOR AND MIDDLE CLASSES.

DR. LONGFIELD.

1. Mention such instances as occur to you of Shemitic and Aryan verbs, which apparently have common roots.
2. Discuss the question as to how far the existence of common radical elements in two languages proves an affinity between the languages.
3. Compare such of the Shemitic and Aryan numerals as seem to have a radical affinity.
4. The Assyrian language throws light on the origin of a Hebrew numeral which was formerly obscure?
5. To which of the better known Shemitic languages has the Assyrian the greater affinity, and in what particulars?

6. To which of the Shemitic nations should, probably, be assigned the credit of having perfected the Shemitic alphabetic system? and on what grounds?

7. What inferences have been made from the names of the letters as to the state of civilisation of the people, with which the nomenclature originated?

8. Is the fact that the names of the letters are Shemitic reconcileable with the opinion of those who hold that the forms were derived from Egypt?

9. What is the earliest indication of the Aramaic as a distinct language? What other dialects besides the Chaldee and Syriac belong to this branch of the Shemitic language family, and what literature do they possess?

10. In the note at the end of Genesis the words occur וסדריו מִן. What is the division of the text referred to? In what other senses is the word סדר or סדרא used?

11. Explaining the Masoretic term פריגמא Elias Levita says:

פריגמא, כן קראו ההפסכה שבאמצע הפסוק,
כגון ויאמר קין אל הבל אחיו • ויהי בהיותם בשדה,
נמסר עליו כה פריגמות במצע פסוק ד' מנהוג
בתורה

Translate this.

12. On 1 Kings vii. 40, there is the note

הפטרות ויקהל כמנהג אשכנזים והיא הפטרות
פקורי כפי הספרדים.

Explain this. What is the derivation of הפטרות?

13. What is indicated by the headings פפפ and ססס in the Pentateuch?

14. Explain the Masoretic terms קרחי and נסיב, סביר, אִמָּאָה, אִנָּךְ, and the abbreviations מוקדמין ומואחרין, שבנ.

PSALMS.

MR. POOLE.

1. Hebrew poetry differs essentially in its structure both from classical and modern poetry?

2. The text of the Psalms is probably now arranged differently from the original mode in which it was written. How may this be inferred; and to what circumstances may the change be attributed?

3. Rosenmüller remarks that several of the differences of readings in Ps. xviii., and 2 Sam., ch. 22, seem reducible to classes. Mention some of the classes?

4. Give instances in which a marginal note in the LXX. appears to have got into the text, as shown by a double translation of the same Hebrew words?

5. (a) The inscription of Ps. v. in the Hebrew is

לִמְנַצַּח אֶל-הַנְּחִילוֹת מִזְמוֹר לְדָוִד

What is the corresponding inscription in the LXX?

(b) What circumstances in the Greek inscriptions of the Psalms seem to mark them as of a later date than the Hebrew?

6. אֲזַי יְדַבֵּר אֱלִימוֹ בְּאַפּוֹ וּבַחֲרוֹנוֹ יִבְהַלְמוּ :
וְאֲנִי נִסְכַּתִּי מִלְכִּי עַל-צִיּוֹן הָר-קְדֹשִׁי :

Ps. ii., vv. 5, 6.

(a) Some would translate the first clause "Tunc iratus heroas eorum perdet." How is this to be deduced from the text?

(b) The LXX. translates the first clause of the second verse *ὁ κύριος ἐκκαταστήσεται βασιλεύς*. This can be easily deduced from the Hebrew.

7. כִּי הִגָּה הָרָשָׁעִים יִדְרָכוּ קֶשֶׁת כּוֹנֵנִי חָצֵם
עַל-יָתֵר לִירוֹת בְּמוֹ-אֶפֶל לְיִשְׂרָאֵל : כִּי הַשָּׂתוֹת
יִהְיֶה צֶדִיק מִה-פָּעַל :

Ps. xi., vv. 2, 3.

(a) Translate this passage, noticing the peculiar use of the future in the first clause.

(b) The LXX. reading of verse 3 is different in sense from the Hebrew. State it; and how it is to be understood.

שִׁמְרֵנִי בְּאִישׁוֹן בֶּת-עֵצִים בְּנֶפֶד תַּסְתִּירֵנִי : 8.
מִפְּנֵי רָשָׁעִים וְנֹשְׁרֵי אִיבֵי בִנְפֹשׁ יִקְיֹפוּ עָלַי :
חֲלַבְמוֹ סָגְרוּ לִימוֹ דִּבְרוּ בְּנֵאוֹת : אֲשֶׁר־נֹשְׁרֵי עֵתָה
סָבְבוּנִי עֵינֵיהֶם יִשִּׁיתוּ לְנֹטוֹת בְּאֶרֶץ :

Ps. xvii., vv. 8, 9, 10, 11.

(a) Translate this passage.

(b) Different origins have been given to the word בֶּת used here; and parallels adduced in support of each?

(c) Different senses have been given to the words חֲלַבְמוֹ סָגְרוּ. A passage from the prophet Hosea supports one of these?

(d) The last clause in this passage may be differently interpreted. What sense does Delitzsch prefer? The LXX. version gives a different one?

וַיֵּט שָׁמַיִם וַיִּרֶד וַיַּעֲרֹפֶל תַּחַת רַגְלָיו : וַיִּרָב 9.
עַל-כְּרוֹב וַיַּעַף וַיֹּדֵא עַל-כְּנָפֵי-רוּחַ : יֵשֶׁת חֲשָׁד
סָתְרוּ סָבִיבוֹתָיו סָכְרוּ חֲשֹׁכֶת-מַיִם עָבִי שְׁחָקִים :

Ps. xviii., vv. 10, 11, 12.

(a) Translate this passage; and write notes on any of the more unusual words occurring in it.

(b) The parallel passage in 2 Sam., ch. 22, differs in the reading of two words. State those words and their senses.

כָּל-רֹאֵי יִלְעִינוּ לִי יִפְטִירוּ בִשְׁפָה יִנִּיעוּ 10.
רֹאשׁ : גַּל אֶל-יְהוָה יִפְלֹטוּ יִצִּילוּ כִי חֲטָא בּוֹ :
כִּי-אַתָּה גָּחַי מִבֶּטֶן מִבְּטִיחִי עַל-שְׁדֵי אִמִּי :

Ps. xxii., vv. 8, 9, 10.

a. Translate this passage.

b. How are the portions of it quoted there translated in the New Testament?

c. How is the word גַּל to be grammatically explained according to its different interpretations?

d. Add the vowel points in this passage.

כִּי כָלוּ בִגְדֵי חַיִּי וְשִׁנּוֹתַי בְּאֶנְתָּה כָּשָׁל 11.

בְּעֹנִי כָחִי וְעַצְמִי עָשָׂשׁוּ : מִכָּל-צֹרְרֵי הָיִיתִי
חֲדָפָה וְלִשְׁכֹּנִי , מֵאֵד וּפְחַד לְמִיָּדָע רָאִי בַחֲוֹץ
גִּדְרֵי מִמֶּנִּי :

Ps. xxxi., vv. 11, 12.

a. Translate this passage.

b. How does Delitzsch interpret the word מֵאֵד ? Does the LXX. support him by its translation ?

כִּי רִשָּׁעִים , יֹאבְדוּ וְאֵיבֵי יְהוָה בִּיקָר כָּרִים
כָּלֹו בַעֲשָׂן כָּלֹו : לֹוֹה רִשָּׁע וְלֹא יִשְׁלַם וְצָדִיק
חֲוֹנֵן וְנוֹתֵן :

Ps. xxxvii. vv. 20, 21.

a. Translate this passage ?

b. The expression בִּיקָר כָּרִים has been differently explained.

c. The LXX. gives a wholly different interpretation ; what changes does its translation require in the Hebrew text ?

13. Give the passages of the LXX. which correspond to the following in the Hebrew :—

לְקַדּוּשִׁים אֲשֶׁר-בְּאֶרֶץ הַמָּה וְאֲדִירֵי כָל חַפְצֵי-בָם :

Ps. xvi., v. 3.

זָבַח וּמִנְחָה לֹא חֲפָצָה אֲזִנִּים כְּרִית לִי עוֹלָה וַחֲטָאָה
לֹא שְׁאֵלָה

Ps. xl., v. 7.

14. Give the Hebrew text which corresponds to the following verses of Ps. xxxv. in the Authorized Version :—

“But in mine adversity they rejoiced, and gathered themselves together: yea, the abjects gathered themselves together against me, and I knew it not; they did tear me, and ceased not.”

“They rewarded me, evil for good, to the spoiling of my soul.”

15. Translate the following notes on passages in the Psalms :—

a. יִבְשׁוּ וַיִּבְהֻלוּ מֵאֵד כָּל-אֵיבֵי יִשְׁבּוּ יִבְשׁוּ רִנֵּעַ

Ps. vi., v. 11.

כִּשְׂרָאוֹ שְׁלֹא עֲלָתָה מַחֲשַׁבְתָּם יֵשְׁבוּ אֵלַי לְהוֹיֹת
בְּשָׁלוֹם עָמִי וּבְאוֹתוֹ רִנֵּעַ יְהוָה לָהֶם בּוֹשֶׁת מִמֶּנִּי

ב. כִּי בֶךְ אֶרֶץ נְדוּד

Ps. xviii, v. 30.

כִּי בֶךְ בַּעֲזֶרְתְּךָ אֲשֶׁבֶר נְדוּדֵי אוֹיְבֵי וְאֶרֶץ מִשׁוֹרֶשׁ
רָצָץ וּבֹא בְּשׁוֹרֶק אוֹ פִּירוֹשׁוֹ אֶרֶץ לִקְרֹאת נְדוּד
אוֹיְבֵי וְלֹא אִירָא מֵהֶם

GRAMMAR.

DR. DICKSON.

1. Under what circumstances is the conjunction ׀ punctated ׀ and ׀? Give examples.

2. Write out the suffix pronouns with the preposition לְ prefixed.

3. All the prepositions may be traced in their origin to other parts of speech.

4. How does the *pause* affect a vowel? e. g. שְׁמֶרְךָ, לְךָ.

5. Write out the third person mas. fut. of the several conjugations of נָלַךְ, קָטַל and קָם.

6. How are the *cardinal* and *ordinal* numbers distinguished in Hebrew? Give the first five of each.

7. Explain the connexion of the substantive with the adjective (a) when it is *qualitative*, (b) when it is *predicative*.

8. How is the *present* tense expressed in Hebrew? e. g. *I kill, thou killest, he kills.*

9. How is the particle אֲנִי used with the finite verb?

10. What is the difference of meaning when the finite verb is used with the infinitive *absolute* and *construct*?

Translate the following passage into Hebrew :—

And Jacob said, O God of my father Abraham, and God of my father Isaac, the LORD which saidst unto me, Return unto thy country, and to thy kindred, and I will deal well with thee :

I am not worthy of the least of all the mercies, and of all the truth, which thou hast shewed unto thy servant ; for with my staff I passed over this Jordan, and now I am become two bands.

Deliver me, I pray thee, from the hand of my brother, from the hand of Esau : for I fear him, lest he will come and smite me, and the mother with the children.

And thou saidst, I will surely do thee good, and make thy seed as the sand of the sea, which cannot be numbered for multitude.

Gen. xxxii. 9-12.

MR. ABBOTT.

a. בְּקֶהְלָם אֶל-תַּחַד כְּבֹדִי :

b. אִם-תִּיטִיב שְׂאֵת וְאִם לֹא תִיטִיב לִפְתָּח

חֲשֵׁאת רֵבֶץ :

c. אִישׁ הִרְגָתִי לִפְצָעִי :

d. אִילָה שְׁלַחָה הִפְתָּן אֲמַרִי שָׁפָר :

e. בְּעוֹד כְּבֹרֶת-אָרֶץ לְבֹא אֶפְרָתָה :

1. Translate these passages.
2. Write notes on the interpretation of each.
3. Quote any of the ancient versions with which you are acquainted.
4. In *a* parse תַּחַד.

In *d* point אִילָה and אֲמַרִי according to the different renderings proposed.

5. Quote the original of the following, and correct the English version :—

“Every plant of the field before it was in the earth.”

“He made the stars also.”

“The evening and the morning were the (first, etc.) day.”

“The fruit tree yielding fruit whose seed is in itself.”

“Coat of many colours.”

6. Discuss the interpretation of the following :—

עַד כִּי יבֹא שְׁלָה :

עַל פִּיד יִשְׁק כָּל עָמִי :

7. Quote instances in which כִּי appears to be used as a relative.
8. What grammatical objection is there to the rendering in Gen. iii., 15, "Ipsa conteret caput tuum?" What various meanings are suggested for the verb שִׁיף in this verse, and on what grounds respectively?
9. Explain the terms

אֲבִיר, אוֹלָם, חֲרָטָמִים, בִּלְעָדִי.

10. Explain the construction in

וְעִזָּב אֶת-אָבִיו וְאִמָּתּוֹ

GENERAL DIVINITY EXAMINATION.

SENIOR CLASS.

THE PROFESSOR OF DIVINITY.

1. On what evidence is asserted the existence of "John the Elder" as distinct from John the Apostle?
2. What internal evidence is there for the assertions that the writer of the fourth Gospel was a Jew—of the first century—that he was an eye-witness of some things which he relates—that he wrote for persons having already a general knowledge of the history—that he was acquainted with other Gospels?
3. State the arguments for and against the Hebrew original of St. Matthew's Gospel.
4. Quote the verses in the Epistle to the Hebrews on which arguments for or against the Pauline authorship have been founded.
5. How does Tertullian quote the Epistle? What is Renan's hypothesis, and what are its difficulties?
6. The mode of commencing the second Epistle to Timothy is the same as in the majority of Paul's undisputed Epistles? What arguments for the genuineness of this Epistle may be founded in connexion with the names of any persons mentioned in it?
7. Mention some of the more remarkable passages in St. Luke's Gospel which are not found in the Vatican MS.
8. What are the MSS. referred to by small letters in critical editions?
9. Which of the great MSS. contain other than Canonical books, and what?
10. What instances are there of grammatical anomalies preserved in the older MSS.?

11. How was the division of the Old Testament into twenty-two books made out?

12. In what case are Italics used in our Version to mark a doubtfulness of reading?

13. An argument in favour of the theory of development has been founded on the history of the word *θεοοῦσιος*?

14. This theory is inconsistent with the respect which in the Church of Rome has always been paid to the authority of the Fathers?

15. By what general line of argument can we show the inconclusiveness of the Roman Catholic *a priori* arguments for the necessity of an infallible guide?

16. Can one who joins the Church of Rome have afterwards greater certainty of the truth of her doctrines than he had before submitting to her?

17. The history of the steps taken in the Donatist controversy inverts the order which according to Roman theory ought to have been followed?

18. What arguments against Roman Supremacy have been founded on the case of Stephen and Basilides? and on the case of Apollinaris?

19. Sayings of Gregory Nazianzen have been quoted against the authority of Councils: what personal reasons had he for speaking so strongly?

20. How does the claim of infallibility for the decision of a Council diminish the chance of the Council's arriving at true conclusions?

21. What are the arguments used by Thomas Aquinas against the doctrine of the Immaculate Conception; and how were they answered by Scotus?

22. What was the first occasion of a sale of indulgences on a large scale?

23. Tertullian did not admit the right of the Bishop of Rome to grant indulgences?

24. It is contended that there is no immorality in the doctrine of indulgences rightly understood; and that no power is claimed for the Pope greater than Protestants claim for themselves?

25. What is the doctrine of the treasure of the Church? By whom was it first put forward? What are its difficulties?

26. What were the chief points discussed at the Council of Florence? What differences have there been between Greeks and Latins as to the intermediate state?—as to the epoch of the change in the Eucharist?

27. Three changes made in our Communion Office at the last revision bear on the question of an objective presence in the Eucharist. None of these changes, however, can be ascribed to Roman Catholic influence?

28. In the controversy concerning an objective presence an appeal is made to the prayer of humble access; what can be stated in reply?

29. What passages in the Prayer Book throw light on the sense in which our Church understands the words *εἰς τὴν ἐκκλῆσιαν ἀνάμνησιν*?

30. The Canon of the Mass itself bears witness against the notion that the early Church believed in an absolute change of the elements?

31. In what senses does our Service acknowledge the Eucharist as a sacrifice? The ancient Liturgies are inconsistent with the Romish theory of the Eucharistic sacrifice?

32. How did the early Creed of the Roman Church differ from that which we know as the Apostles' Creed?

33. Why would it have been practically impossible in the ancient Church to maintain an absolute independence of one diocese over others? What instances are there of the suppression of local usages by the authority of the universal Church?

34. On what grounds do Roman Catholics now rest their rejection of Anglican Orders?

35. Why does Sozomen not insert the Nicene Creed in his history?

36. Give an account of the history of the insertion of the word "filioque."

37. What is the Adoptionist heresy? What is its connexion with the controversy concerning the Athanasian Creed?

38. How would you reply to those who deny that a man is responsible for his speculative belief?

JUNIOR CLASS.

DR. LEE.

PROFESSOR'S LECTURES.

(Proposed to all Candidates.)

1. Define the branches of the Theistic argument known respectively as the *a priori*, the *a posteriori*, and the *Intuitionist*.

2. Show that the objection to the *a priori* argument, as a *practical* proof, is invalid.

3. What is the force of the *negative* presumptions founded on the existence of evil, against the argument from Design, which the theologian has to encounter?

4. How are the Divine names Jehovah and Elohim employed in the opening chapters of Genesis? The use of these names refutes, by anticipation, both Polytheism and Pantheism?

5. How does the performance of a miracle prove a Divine mission? Quote the leading texts which show that our Lord distinctly appealed to His miracles as establishing the truth of His office and character.

6. Show that the representations given of our Lord by Renan, and by Strauss (in the latest edition of his "Life of Jesus"), are self-contradictory.

7. Explain the "double sense" of Prophecy. Show the importance of this principle, and how it is recognized in the New Testament.

8. Where in the Authorized Version is the word "Person" applied to God? What Greek word is thus translated?

9. Give S. Augustine's definition of "Sacrifice;" and state distinctly what is meant by saying that the Sacrifice of Christ was *vicarious*.

10. The date of the composition of the Athanasian Creed may be fixed approximately by internal evidence. Show this; and give a brief account of the recent attempt to fix the date some centuries later.

(The following additional Questions are proposed to Candidates for Bishop Forster's Premium.)

11. For the completion of the Theistic argument from *Design* what is necessary? The fact of *crystallization* does not answer to this idea; and show that it is *man* only who reveals the great secret of the authorship of nature.

12. Compare the theories proposed by Dr. Chalmers and Mr. Isaac Taylor to explain how Prayer may be answered without interrupting the order of Nature.

13. Criticize the logic of the assertion that miraculous facts must be scientifically tested.

14. Write a note on the modern, as distinct from the earlier, criticism of the writings of S. John, with special reference to the school of Tübingen, and the more recent speculations of Keim.

15. Mark out the historical stages in the Trinitarian controversy; and point out how and when the discussion of Christology began to follow a course by itself.

16. State, in the words of Hooker, how the Persons of the Trinity are distinguishable from each other. How is this distinction made known to us? Apply this conclusion to the cases of the Second and Third Persons.

17. Write a note on the theological sense of the word "person" as applied to the Godhead; criticizing the passage in Whately's *Logic* where the word "person" is placed among ambiguous Terms.

18. State distinctly at what point all inquiries intended to explain the Atonement by Christ must come to a stand; and show how the doctrine of "Imputation" has been misused for this purpose.

19. Describe the ceremonies connected with "the scapegoat" (*marg. Azazel*, Levit. xvi.); and write a note on the different theories suggested in explanation of this term.

20. Define the distinction between an *antinomy of reason*, and a *contradiction*. Give the leading illustrations in the province of religion of this distinction.

PEARSON ON THE CREED.—*Articles ii., viii.*

1. Give the substance of Pearson's notes on the words *συνήρ*, and *χριστός*, and on their signification among the heathen.

2. State, after Pearson, the various stages of the Sabellian heresy. Quote the texts with accuracy by which Pearson refutes it.

3. What was the heresy of Photinus of Sirmium? How does Pearson refute it?
4. State Pearson's "second assertion particularly opposed to the Arian heresy." Quote the version of the Nicene Decree, as translated by S. Hilary.
5. Give with accuracy Pearson's deduction from the words: "I and the Father are one."
6. Pearson connects the Messianic prediction of Haggai with words of Malachi. Quote the passages, and draw the inference.
7. How does Pearson argue against those who deny the Divinity of Christ from the alleged use of *Κύριος* as the equivalent of Adonai?
8. Give accurately the three texts from which Pearson infers that "the second part of the office of the Holy Ghost is the sanctification of man in the regeneration and renovation of him."
9. Give the substance of Pearson's explanation of the word *Paraclete*.
10. How does Pearson show that the teaching of the Eastern and Western Church on the subject of the Procession of the Holy Ghost may be harmonized?

COMPOSITION.

Write a Sermon on the text—

"But wilt thou know, O vain man, that faith without works is dead?"—S. James, ii. 20.

Or (*to be taken by Candidates for Bishop Forster's Divinity Premium*) write an Essay on the following subject:—

"The true meaning and necessity of *Dogma* in religion."

DIVINITY PRIZE EXAMINATION.

JUNIOR CLASS.

DR. LEE.

PROFESSOR'S LECTURES.

1. State the distinctive features of Pantheism as held by the Hindoo, the early Greek, and the modern Unbeliever.
2. Write a note on the pantheistic denial of "Creation."
3. What indications may be noticed in modern times of a tendency to revive the doctrine of Metempsychosis?

4. What problems was this doctrine introduced to solve? Prove that it fails to do so in all respects.
5. Enumerate the theories devised in order to explain the origin of Evil.
6. How have Archbishop King and Julius Müller respectively argued against the notion of Dualism?
7. Give some account of Jewish history between the dates of the closing of the Canon of the Old Testament, and the Birth of Christ.
8. State the leading features of the controversy as to the authenticity of the Book of Daniel.
9. Give a sketch of the Mythical theory propounded by Strauss, and the heads of a reply to his system.
10. The progress of physical science is continually diminishing the force of the objection that our Lord's miracles were owing to His being far in advance of His age in knowledge of the powers of nature?
11. By what principle, to be always recognized by the Christian Apologist, may the claim of the modern so-called "Spiritualists" to rival the miracles of Scripture, be set aside?
12. Classify, and reply to, the leading objections to the Christian argument founded upon the fulfilment of Prophecy.
13. Trace the history of the two opposing errors in opposition to which, on either side, the true doctrine of the Trinity has had, from the first, to maintain its ground.
14. How did the Arians, the Sabellians, and Paul of Samosata, respectively, argue from the use, by the Church, of the terms *ὁμοία* and *ὁμοουσιος*?
15. In what different senses may the term "*generation*" as applied to our Lord be understood?
16. To what misapprehension of the doctrine of the Eternal Generation of Christ may the denial of that doctrine be ascribed? Give the heads of the Scriptural proof of that doctrine.
17. Show that the death of Christ was, in perfection, what all previous sacrifices, in their measure, had been.
18. Answer the objection that the doctrine of the Atonement does not occupy so large a place as one might expect in the teaching of the early Church.
19. Develope the argument for the Atonement founded upon the universal practice of mankind.
20. Write a note on the theological rule known as *Communicatio Idiomatum*. Illustrate this rule from Scripture.

GREEK TESTAMENT.

1. State briefly the principal notices, during the second century, of the Gospels. Describe the earliest catalogues of the Books of the New Testament.

2. Give some account of the MSS. D. and Z. ; also of the Syriac Versions, including the "Curetonian Syriac."

3. Write critical notes on—

(a). S. Mark, vi. 22, noting the difficulty of the various reading ;

(β). The authenticity of the passage, S. Mark, xvi. 9-20 ;

(γ). The position of the doxology, Rom. xvi. 25-27.

4. Translate the following passages, noting any points of importance :—

(a). S. Mark, vii. 18-23, adopting the reading, καθαρίζων πάντα τὰ βρώματα ;

(β). S. Matt. xvii. 24-27 (giving the literal sense of δίδραχμον and στατήρ) ; S. Matt. xxvi. 15, 16.

(γ). S. John, xiii. 23, 25.

(δ). Acts, ii. 47 ; xxvi. 27-29.

(ε). Rom. i. 28-32.

5. Translate and explain :—

(a). ὁ βδελυσσόμενος τὰ εἰδωλα ἱεροσυλεῖς ;

(β). ἡνυχόμεν γὰρ ἀνάθεμα εἶναι αὐτὸς ἐγὼ ἀπὸ τοῦ Χριστοῦ :— ἤθελον δὲ παρῆναι πρὸς ὑμᾶς ἄρτι.

(γ). ἦν ἀρχόμενος ὥσει ἐτῶν τριάκοντα.

(δ). Εὐδιδίαν παρακαλῶ καὶ Συντύχην . . . συλλαμβάνου αὐταῖς αἰτίαις . . . συνήθλησάν μοι.

(ε). μή τις ὑμᾶς ἔσται ὁ συλαγωγῶν.

(ζ). εἰ πνεῦμα ἅγιον ἐλάβετε πιστεύσαντες ;

6. Translate, and exhibit the force of the preposition in the following passages :—S. Matt. xv. 3, 6 ; S. John, xv. 3 ; Acts, ii. 23 ; Rom. iii. 25 ; Gal. iii. 19 ; Eph. iii. 10.

7. Write a note on the words δίκαιος, δικαιοσύνη, δικαίωσις, δικαίωμα (translate Rom. ii. 26).

8 Compare, and give instances of the use of the words : εἰκών, ὁμοίωμα, —μορφή, μόρφωσις. σχῆμα (translate Rom. xii. 2), —κόσμος, αἰών, —χρόνος, καιρός, γενεά, —ἕτερος, ἄλλος, —αὐλή, ποιμνή.

9. Distinguish, and illustrate by examples, the use of φαίνειν, φαίνεσθαι ; κτᾶσθαι, κεκτῆσθαι ; εἶναι, γίνεσθαι ; μετανοεῖν, μεταμέλεσθαι.

10. Mark the force of the absence of the article with—

(a). πνεῦμα ἅγιον in Rom. v. 5 ; with γραφή, Rom. xvi. 26 ; with νόμος, Rom. vii. 9 (as compared with ver. 1), Gal. iii. 10.

(β). Write a note on the use of Χριστός in the New Testament, with and without the article.

COMPOSITION.

Discuss the truth revealed in the N. T. that our Lord Jesus Christ is "the Second Adam."

EXAMINATION FOR DEGREE OF BACHELOR IN MEDICINE.

PHYSIOLOGICAL ANATOMY.

PROFESSOR M'DOWEL.

1. Describe the structures of which the pons varolii is composed.
 2. Enumerate the connexions of the cerebellum with other segments of the encephalon.
 3. Give the origin, intra-cranial course, and distribution of the ninth cerebral nerve.
 4. Describe the arrangement of the muscular coat of the stomach.
 5. By what channels can the blood of the lower part of the body reach the heart when the inferior cava is obliterated?
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SURGERY.

DR. E. H. BENNETT.

1. State the diagnosis of cystic disease of the ovary from ascites, and also the conditions under which the two diseases coexist.
 2. Give the characters of the ordinary form of fracture of the lower jaw, its treatment, and the complications that most frequently attend it.
 3. Name the varieties of epistaxis, and indicate their causes and modes of treatment.
 4. What are the conditions under which inguinal and femoral herniæ may be mistaken, each for the other? How should a case of this class be dealt with when an operation is necessary for the relief of symptoms of strangulation?
 5. Describe the symptoms that indicate the passage of a calculus along the ureter in the male. Give the treatment of the patient during the existence of the symptoms, and after their cessation.
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MEDICAL JURISPRUDENCE.

DR. TRAVERS.

1. The recent dead body of a human fœtus being referred to your inspection, from what characters will you deduce
 - (a) that it was *viable* ;
 - and
 - (b) that it had *survived its birth* ?

2. It is suspected that Veia is in the *gravid* state : if she is, the uterus has not yet emerged from the pelvis. To what circumstances, then, will you direct your attention, with the object of confirming, or of dispelling such suspicion ? State your reasons for whatever opinion you prefer.

3. When may you expect to find that a *poison* (other than a morbid one) has manifested its effect upon the *osseous* system ?

4. Where persons have perished in a *conflagration*, and their remains have been only superficially and partially burned, so that considerable portions of trunk and limbs, as well as of their clothing, present no appearance of injury, what results of your anatomical investigation will support the conclusion that death had preceded the contact with flaming or incandescent objects ?

5. Give instances of *temporary unsoundness* of mind, associated with physical conditions on which it seems to depend, or to which it may be referred as an effect.

MIDWIFERY.

PROFESSOR SINCLAIR.

*1. *Case*.—"Sent for to see A B, whose labour, at full term, had set in about midnight. On arrival the os uteri was found nearly the size of a half-crown piece ; lip soft and dilatable ; membranes unruptured ; head presenting. At 2 o'clock, A. M. uterine action ceased, and did not recur for a week afterwards."

Write a short dissertation on the above case, mentioning everything you consider worthy of comment.

2. Mention all the cases in midwifery practice in which the tampon would prove injurious, and those in which you would consider yourself called upon to use it.

3. Describe all the cases in midwifery practice in which the operation of version may be called for.

4. Given a case of left dorso-anterior of shoulder presentation ; describe *most minutely* the operation for accomplishing delivery.

5. Describe the various applications now applied to the surface of the mucous membrane of the uterine cavity. For what, and how are they, each of them, used ?

INSTITUTES OF MEDICINE.

MR. PURSER.

1. Describe the epithelium which lines the inner surface of the cheek.

2. Contrast the endothelium of the arteries, veins, and capillaries.

3. What do you understand by arterial tension ? How is it measured ? Under what influences does it vary ?

* Each Candidate is expected to attempt this.

4. What is the *depressor nerve* of the heart? What is the function of this nerve?
 5. Mention the chief circumstances which promote the coagulation of the blood.
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EXAMINATION FOR DEGREE OF MASTER IN SURGERY.

DR. ADAMS.

1. In the case of an old man who had suffered from chronic enlargement of the prostate gland, and who had at last sunk exhausted by fever and urinary irritation, state the morbid appearances you might expect to find on making a *post mortem* examination in this case; the size and form the gland usually assumes; the state of the muscular tunic of the bladder; that of the mucous membrane, its colour, &c.
 2. Mention the names of those surgeons who, from the time of John Hunter down to a modern date, have alluded to the treatment of un-united fracture of the bones of the extremities, and with what result?
 3. Mention the difference in the symptoms, pathological anatomy, and treatment to be found in the account given of the *senile* gangrene of the feet, described by Mr. Pott, and that of the *symptomatic* gangrene of Baron Dupuytren.
 4. State the characteristic symptoms of osseous cyst of the lower jaw; and say in what works shall be found the description of the disease, and the surgical treatment.
 5. In the case of an ordinary abscess of the tonsil in a young person or adult, say to what means you should resort to evacuate the matter.
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DR. BUTCHER.

1. Describe the various ways in which cancer may attack the penis, and the operative treatment applicable to each; also state minutely the affections which may be confounded with cancer.
2. With what affection of the testicle may venereal disease of the organ be confounded? Diagnose each kind from the other, and describe the different characters which the affection may present, and the treatment suitable.
3. Mention the different forms of polypus nasi; also the diagnostic characters of each. Localize the several forms, and the treatment applicable to each kind.
4. Describe the symptoms, appearances, &c., of a case of Pott's gangrene, from its earliest state, through its several stages, and its modes of termination.

5. Mention minutely the forms of gangrene described by Dupuytren, symptoms, stages, &c., and the pathology of each.

SURGICAL ANATOMY.

DR. M'DOWEL.

1. Describe the parts (superficial and deep) as they are met with in the dissection of the bend of the elbow.

2. Mention in their order the parts which are contained in the anterior division of the digastric space.

3. Describe the coraco-clavicular ligaments, and assign their uses.

4. Compare and contrast the capsular ligaments of the shoulder and hip joints.

5. Describe the peritoneal surface of the inguinal region, and trace the course taken by a direct inguinal hernia from within outwards.

SURGERY.

DR. E. H. BENNETT.

1. What is the operation known as "internal urethrotomy"? State the indications for its adoption, and the essential differences between the modes of Stafford, Civiale, and Maisonneuve.

2. Describe the symptoms of acute suppurative bursitis, attacking the bursa anterior to the patella. State its causes and treatment.

3. Give the characters of the dislocation of both bones of the forearm backwards at the elbow. Mention the injuries most likely to be confounded with it, and the diagnosis in each case.

4. Describe the symptoms of acute necrosis of the diaphysis of the tibia in youth. What treatment would you adopt for their relief, and subsequently?

5. Describe the operation of tying the superficial femoral artery in Scarpa's angle, and state the common causes of death, when the operation adopted for the relief of popliteal aneurism, proves fatal.

MR. WILSON.

1. Describe a case of Pannus, its causes, course, terminations, and treatment. Mention the differential diagnosis between it and interstitial keratitis.

2. Describe the appearance presented by an eye which has become blind from chorio-iritis. Mention the causes of the disease, and the treatment; specifying in particular what circumstances should influence and guide our opinion and treatment.

3. Describe and explain the appearances met with in staphyloma positum, and how it is to be recognised.
4. Describe pustular ophthalmia. At what age does it usually occur; what disease is liable to be mistaken for it; and what should be its treatment?
5. Describe the appearances presented by hypopion; mention its causes and origin, and what should be its treatment.

MEDICAL TRAVELLING PRIZE.

DR. STOKES.

1. What is meant by the term 'change of type' in disease. Is it held to apply to essential or local disease, or to both forms? Has the condition of the blood been observed?
2. The free employment of blood-letting has been disused in this country for many years. Indicate the conditions in which the lancet has been found in latter times beneficial.
3. What is meant by the term 'croupous pneumonia'? How does it occasionally simulate pleuritic effusion?
4. Does the observation of great epidemics favour or militate against the belief of their propagation by contagion, and how is their cessation explained?
5. Give examples of acute and formidable diseases so far found to be unattended with manifest or characteristic organic change.
6. In essential diseases under the law of periodicity, how far are the local or secondary affections subject to the same law?

DR. MOORE.

1. State what diagnostic and prognostic value you attach to a careful observation of temperature, and mention some of the causes which give rise to alterations of temperature in disease.
2. Describe the symptoms, physical signs, and pathology of hydatid disease of the liver; the complications which may ensue, and the treatment you would adopt.
3. What are the symptoms which attach to cases of general paralysis and paralytic dementia connected with syphilis?
4. Detail the various modifications of "aphonia," their differential symptomatic value, and the pathology which attaches to each.
5. Mention the conditions under which enlargements of the spleen are met with, the abdominal tumours they may be confounded with, and their differential diagnoses.

6. State Eulenberg's views on cerebro-spinal meningitis, and what peculiar condition he has found the epidemic coincident with.

M A T E R I A M E D I C A .

DR. AQUILLA SMITH.

1. In a case of renal disease accompanied with anasarca, and albuminous urine, prescribe (without abbreviations) the remedies to be employed with the object of relieving the patient, and without acting on the kidneys.

2. Define the physiological, and the therapeutical action of remedies. State the objections to applying the results of experiments with medicines, on the lower animals, to the treatment of disease in man, and give illustrations.

3. Describe the methods of applying heat in the treatment of disease. Contrast the effect of dry hot air, and vapour.

4. Define an Emmenagogue, and enumerate the remedies usually classed under that name. State your opinion of the special action of two of the remedies.

5. Give the characters of Santonine; mention the peculiar effects which follow its employment; and give proof that the change which it undergoes on exposure to air and light is not owing to oxidation.

6. Give the distinctive characters of Bromide, and of Iodide of Potassium. State their therapeutic action, and the diseases in which each remedy proves most beneficial.

T O X I C O L O G Y .

DR. TRAVERS.

1. What circumstances favour the action of *water on lead*? State how you would propose to counteract the contaminating influence, in cases where it might not be convenient to avoid altogether the use of leaden pipes or vessels.

2. When the death of the fœtus just before birth, and at the termination of the full period of uterine existence, is attributable to the effects of *secale cornutum* administered to the mother, whether should such result be referred to the toxic or the dynamic operation of the drug?

3. Enumerate those poisons whose action is chiefly directed to the heart, without any previous effect appearing to be exerted on the cerebro-spinal nervous system.

4. In what poisons has the *effect of habit* in diminishing susceptibility to the toxic action been exemplified?

5. Distinguish the action of *chloroform* in causing death—

(a). When taken in its liquid state into the stomach;
and

(b). When inhaled into the lungs, in the form of vapour.

Give your reasons for whichever view you prefer, and, so far as your experience enables you, support your choice by reference to actual cases and dissections.

6. In the *treatment of acute poisoning*, what are the cases in which (a) you would rely on the use of diffusible stimuli; and (b) what those for which opiates or other anodynes would be the chief remedies?

MEDICAL PATHOLOGY.

MR. PURSER.

1. Describe the intestinal lesions met with in typhoid fever.
2. What is hæmorrhagic infarction? In what organs is it most frequently seen?
3. Describe the life history of the *trichina spiralis*.
4. Describe the microscopic appearances of pus. Give a sketch of Cohnheim's researches on the origin of this substance.
5. Describe the appearances of the kidney in a well-marked case of amyloid disease of this organ. Contrast them with those seen in a case of the "large white kidney."
6. Enumerate the principal morbid changes to which the serous membranes are liable.

SURGICAL TRAVELLING PRIZE.

SURGICAL ANATOMY.

DR. T. E. LITTLE.

1. Describe the arches of the foot; mentioning fully the anatomical arrangements and structures which maintain them.
2. Give the structure, position, and relations of the lacrymal sac. Explain the effect exercised upon it by the tensor tarsi muscle, and by the tendo oculi.
3. Name the chief irregularities to which the following arteries are subject, and the surgical significance of these deviations:—(a) Subclavian; (b) brachial; (c) femoral; (d) internal pudic; (e) obturator; (f) palmar arches.
4. Describe the fasciæ met with in the dissection of the anterior perineal region; mentioning the connexions of their reflections—(a) superficially; (b) with one another; (c) with deeper structures.
5. Describe the dissection you would make in order to expose fully the anterior surface of the abductor indicis; naming the parts in the order in which you would meet them.

6. Give the descriptive and relative anatomy of the fully-developed thymus gland: mention the particulars of its development. What authors are you acquainted with who have written upon its anatomy? Mention what you know of its pathological or surgical importance.

MR. WILSON.

1. Define Emmetropia. Describe the changes which take place when an emmetropic eye alters its fixation from distant to near vision. Explain how these changes are produced, and how they may be demonstrated.

2. Enumerate and explain the anomalies of refraction, and the disorders of accommodation, their symptoms and complications. How are they to be recognised, and how treated?

3. Describe the appearances, symptoms, and pathology of conical cornea. What treatments have been recommended?

4. Describe the ophthalmoscopic appearances of detachment of the retina, and the effects upon vision of that condition. What are its causes, and how should it be treated?

5. Mention the conditions which indicate that iridectomy should be performed.

6. Describe sclero-choroiditis anterior; its course, complications, and terminations. What are its causes, and how should it be treated? What may it be mistaken for?

PREVIOUS MEDICAL EXAMINATION.

ANATOMY.

PROFESSOR M'DOWEL.

1. Enumerate the foramina seen in the superior maxillary bone.

2. Give the bony attachments of the tentorium cerebelli.

3. Enumerate the sinuses which convey blood into, and those which convey blood out of, the torcular herophili.

4. Mention the peculiarities of the first rib.

5. What structures must be removed to expose fully the flexor digitorum sublimis?

6. Enumerate the muscles of the thumb, and assign the action of each.

7. Give in their order the branches which arise from the abdominal aorta.

8. Enumerate the parts to which the femoral artery is related by its posterior surface.
9. Give the origins of the adductor muscles.
10. Describe the ossification of the femur.

MR. LESLIE.

1. How are the specific gravities of solids and liquids determined?
2. By what experiments may the pressure of the atmosphere be illustrated?
3. State the principles of the mercurial and aneroid barometers, and give the corrections necessary to obtain the true from the observed indications.
4. What are the laws of the formation of vapours, and what experiments demonstrate them?
5. State the physical principles on which freezing machines are constructed.
6. What are the methods of finding the hygrometric state of the air?
7. Give any experiments to illustrate the chemical effects of frictional electricity.
8. State the composition of any of the leading voltaic batteries, and mention the precautions to be observed in preparing them.
9. Explain the action of an induction coil, and mention any application of it.
10. Describe any electro-magnetic machine, and state any uses to which it may be applied.

M A T E R I A M E D I C A .

DR. AQUILLA SMITH.

1. Give the composition of Linimentum Saponis, and describe its characters.
2. Write a prescription in Latin (without abbreviations) for two pills equivalent in their action to $12\frac{1}{2}$ grains of Pulvis Ipecacuanhæ Compositus.
3. Describe Colocynthis Pulpa; state its characters, and its preparations.
4. What is Cusso? Mention its specific action, dose for an adult, and mode of administration as directed in the Pharmacopœia.
5. Describe the change which takes place when Tinctura Castorei, Tinctura Cubebæ, or Tinctura Lupuli is diluted with water; and explain the alteration which is produced in each case.
6. State the proportion of opium in a fluid ounce of each of the following preparations:—Tinctura Camphoræ Composita, Tinctura Opii, Tinctura Opii Ammoniata, and Vinum Opii.

7. Give the distinctive characters of fixed and of essential oils. Which of the latter crystallizes at a temperature of 40° , and which one is distinguished by its colour alone?

8. Describe the three preparations of Ferri Sulphas, and state the special pharmaceutical use of one of them.

9. State the mode of preparing Syrupus Papaveris, and Syrupus Rhusados, and the use of each of them.

10. Give the composition of Liquor Atropiæ Sulphatis, and its dose by hypodermic injection.

CHEMISTRY.

DR. APJOHN.

1. Write the formula of tartaric acid; give the successive steps of the process by which it may be extracted from cream of tartar; and explain how it may be distinguished from citric acid.

2. How is tartar emetic made?—what is its chemical formula?—and, should it contain arsenious acid, how would you detect its presence, and ascertain its amount?

3. Give the formula of bromide of potassium; explain how it is made; and the method of detecting in it bromate of potassium, should such impurity be present.

4. How would you prepare solutions of ferrous, and of ferric chloride? Give also the reaction on each of these salts of ferrocyanide, and of ferridcyanide of potassium.

5. A measured ounce of hydrocyanic acid, supersaturated with potash, and treated in the usual manner with the volumetric solution of nitrate of silver, did not give a permanent precipitate until 735 grain measures were added: what percentage of HCy did the acid include?

6. Explain the production of the calcis phosphas of the Pharmacopœia from bone earth.

7. How is the protein of Mulder made?—and what are the two tests which give characteristic reactions with all the proteinic compounds?

8. Write the formula of ether proper, and explain its production in the continuous process. Explain also the conversion of alcohol into hydrochloric and acetic ether.

9. Liquor sanguinis and the serum of blood are not the same: what is the difference between them?

10. How is fibrin distinguished from coagulated albumen, and a solution of egg-albumen from that of the serum of blood?

11. Mention the course you would take in testing for albumen with ferrocyanide of potassium, and the nature of the precipitate when such is obtained.

BOTANY.

DR. H. PERCEVAL WRIGHT.

1. What is meant by the terms Exorrhizal and Endorrhizal?
2. Describe the stem structure of the common Oak.
3. What is the difference between a compound and a simple leaf?
4. Enumerate the chief forms of indefinite inflorescence.
5. Describe the peculiarities of the inflorescence of the Fig.
6. Describe the parts of the flower in the common Buttercup.
7. Mention some of the chief modes of dehiscence of anther lobes.
8. Describe the forms of fruit met with in the Papilionaceæ and Cruciferae.
9. What are the principal varieties of Berry and Drupe?
10. Enumerate the classes and sub-classes of Phanerogamia.

S U P P L E M E N T A L .

C H E M I S T R Y .

DR. APJOHN.

1. Give the process for preparing nitric acid, and explain the formation of the nitrates of silver and bismuth.
2. How is sulphate of mercury made, and what change does it experience when rubbed with water in a mortar?
3. If stannus chloride be added in small quantity to a solution of corrosive sublimate, a white precipitate is obtained; but if an additional quantity of the stannus chloride be used, the white precipitate becomes grey. How are such results explained?
4. How is the zinci chloridi liquor made, and by what means is it deprived of the ferrous chloride?
5. Write a list of the metals whose acid solutions are not precipitated by sulphide of hydrogen, but whose neutral solutions are precipitated by sulphide of ammonium.
6. Assuming *Q* to represent an atom of quina, what is the formula of the sulphate of quina used in medicine, and by what means would you test it for cinchona?
7. What are the colour tests for morphia, and how in the case of a mixture of morphia and strychnia would you determine the amount of each?
8. Give the formula of the ethylic ether proper of the B. Pharmacopœia, and describe and explain the continuous process for its production.

9. Describe the process for detecting blood-stains in which H_2O_2 is employed.

10. Write the formula of nitrate of urea, and explain how the urea is extracted from it.

MATERIA MEDICA.

DR. AQUILLA SMITH.

1. Why does an aqueous solution of Nitrate of Silver frequently deposit a black sediment on exposure to light; and what means may be employed to remove the stain of Nitrate of Silver from the skin?

2. What is Isinglass, how is it to be distinguished from prepared Gelatine, and for what purpose is it in the Appendix to the Pharmacopœia?

3. Prescribe (without using abbreviations or symbols) twelve pills, consisting of a mild purgative, a mineral tonic, and a vegetable tonic.

4. What is Elaterium? Give its characters and tests, its action, dose, and mode of administration.

5. Give the derivations of the following names of articles in the Pharmacopœia:—Arctostaphylos, Pterocarpus, and Sarcocolla, and the preparations and use of each of them.

6. What is the proportion of yellow Cinchona Bark in one fluid ounce of the liquid extract, and in one fluid ounce of the tincture?

7. Give the composition and appearance of Linimentum Calcis, and explain the action which takes place when the ingredients are mixed.

8. Describe Mezereum Cortex. In what preparations is it employed, and what is the action of the fresh bark on the skin?

9. State the uses of Carbo Animalis and Carbo Ligni in pharmacy and medicine.

10. Describe the action of acids and alkalies on an aqueous solution of Tinctura Cocci.

BOTANY.

DR. E. PERCHEVAL WRIGHT.

1. Give the subkingdoms, divisions, classes, and subclasses of the Vegetable Kingdom.

2. Give the diagnosis of the natural order Papaveraceæ.

3. Mention the genera of Solanaceæ—containing Plants good (a) for medicine, (b) for food.

4. Refer the following genera to their natural orders:—Aconitum, Aloe, Arnica, Atropa, Brayera, Cephælis, Copaifera, Croton, Ferula, Sinapis.

5. Describe the Plant on the table.

6. Mention some of the chief forms of fibrous vessels.

7. Mention some of the varieties of overground stems.
 8. Describe the leaf of the Orange, Strawberry, and Rose.
 9. Give some of the more remarkable forms of bracts.
 10. Describe the structure of the corolla in any of the Compositæ, naming the genus.
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MEDICAL SCHOLARSHIP EXAMINATION.

ANATOMY.

DR. M'DOWEL.

1. Give an account of the ossification of the occipital bone.
 2. Describe the lachrymal bone, and give its connections.
 3. Describe the obturatores muscles.
 4. Enumerate the muscles which are supplied by the third and by the fifth cranial nerves respectively.
 5. Describe accurately the fascia of Scarpa; give its relations; and mention the dissection you would make to demonstrate it.
 6. Enumerate the primary sulci of the surface of the cerebrum.
 7. Describe the "yellow spot of Sommering." How does it differ from the rest of the retina?
 8. Trace the trunk of the musculo-spiral nerve from its origin to its termination. Give its relations; and mention how it terminates, and where.
 9. Describe the several portions of which the duodenum is composed; and mention the arteries which supply this intestine.
 10. The position and relations of the corpus striatum?
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CHEMISTRY.

DR. APJOHN.

1. Ammonia added to a solution of corrosive sublimate gives a white precipitate, and when added to calomel a black compound is formed. Explain the reactions in virtue of which each is produced.
2. How is chloride of zinc made, and how is it deprived of ferrous chloride? State also how cadmium, if present in it, may be separated.
3. Mention the mode of making liquor plumbi subacetatis, and write the correct formula of the lead compound which it includes. State also how it may be distinguished from a solution of acetate of lead.

4. What is the formula of antimonium sulphuratum, and what are the reactions which occur in its preparation? Explain also why the amount of oxide of antimony in it is subject to variation.

5. Detail the steps of the process for preparing ferrum tartaratum, and write the correct formula of the compound.

6. Explain the process for preparing valerianic acid, and converting this acid into valerianate of zinc. Mention also the mode of distinguishing between butyrate and valerianate of zinc.

7. The acidum phosphoricum dilutum of the Pharmacopœia may contain metaphosphoric acid and phosphorous acid. How are these impurities detected?

8. Give the formula of oxalate of urea, and explain how you would extract the urea from it. Assign also the cause of the occasional alkalinity of the urine, and the nature of the sediments with which such condition of the secretion is usually accompanied.

9. Give the theory of the production of chloral, and of the action exerted upon it by an alcoholic solution of potash.

10. If *St* be taken to represent the haloid residue of stearic acid, what will be the formulæ of stearin, and of the products of its saponification by potash? Specify also how you would deal with these products so as to insulate the glycerine, and the stearic acid.

1. Here is a solution of a single salt. Name its base and its acid, and give an account of the experiments which have led you to your conclusions.

2. You have here a solution of a *Liquor Arsenicalis*, not however of same strength with that of the *Pharmacopœia*. Determine by a volumetric process the amount of Arsenious Anhydride in a fluid ounce of it.

DR. AQUILLA SMITH.

1. What is Squill? Give its characters, action, preparations, and the dose of each.

2. Give the distinctive characters of Creasote and Carbolic Acid, and write a prescription for a draught containing Creasote in permanent solution.

3. What change takes place in *Tinctura Ferri Acetatis* on keeping? Explain the cause of the change.

4. Name the parts of the three species of Rose in the *Pharmacopœia*, the preparations of each of them, and their uses in pharmacy and in prescribing.

5. Give the mode of preparing *Liquor Antimonii Chloridi*. State its characters and tests, and also its use in pharmacy, and its action as a remedy.

6. Write a prescription (without abbreviations or symbols) for six diuretic pills, and also a prescription for a diuretic mixture, with directions for the use of each remedy.

7. Give the distinctive characters of Potassii Bromidum, and of Potassii Iodidum. State their respective therapeutic action, and the dose of each.

8. What is Assafoetida? State its therapeutic action, and the dose and administration of the drug, in a solid and liquid form.

9. Give the therapeutic action and dose of Tinctura Cantharidis. State the effects of an overdose, and the treatment to be adopted in such a case.

10. What precautions should be observed in the employment of Cantharides as a vesicant? How would you treat a suppurating blistered surface in order to heal it rapidly?

P H Y S I C S .

MR. LESLIE.

1. Describe the mercurial and aneroid barometers, and state in detail the various corrections to be applied in order to obtain the true from the observed height.

2. Give the various methods of finding the specific gravities of solids, liquids, and gases.

3. State the laws of vapours, and the mode of proving them by experiment. How would you illustrate what is known as surfusion?

4. How is the hygrometric state of the air deduced from the indications of a wet and dry bulb thermometer? Describe any condensing hygrometer.

5. Describe any experiments made to estimate the amount of animal heat; and state some of the results obtained.

6. By what experiments may the chemical and calorific effects of frictional electricity be demonstrated?

7. Explain the theory of Holtz' electrical machine.

8. Describe the electric batteries in most general use, and mention in detail the precautions to be observed in preparing them.

9. Describe an induction coil, and account for the fact that it gives discharges in a single direction only.

10. State the principle of magneto-electrical machines, describing in detail that of Gramme.

HUMAN ANATOMY.

DR. T. B. LITTLE.

1. Enumerate the muscles of the soft palate; and give of each—
(a) its action; (b) the cerebral nerve by which it is supplied.

2. Describe the dissection you would make in order to expose fully the posterior surface of the capsule of the hip joint; naming the parts in the order met with.
3. Enumerate the nerves with which the portio dura communicates in the different parts of its course.
4. State accurately the exact bony boundaries of the orifice of the antrum of Highmore.
5. What are the "helicine" arteries? By whom so named? Describe them.
6. With what structures is the iris connected at its circumferential border? Describe accurately the manner of such connection.
7. State, of the urethra, the following particulars:—(a) where it is narrowest; (b) where widest; (c) where most dilatable; (d) where least dilatable. What method would you adopt to demonstrate your statements?
8. What objects are seen on raising the apparatus ligamentosus colli?
9. Describe the motions enjoyed by the lower jaw, and the muscles accomplishing them.
10. The peculiarities of the liver in the fœtus; including those of the circulation in it. Explain them.

COMPARATIVE ANATOMY.

DR. MACALISTER.

1. What are the morphological boundaries of the pharynx?
2. What are the respective representatives in birds of the following bones in mammals?—

(a). Malleus.	(c). Stapes.
(b). Incus.	(d). Tympanic.
3. What are the primary branches arising from the arch of the aorta in Man, Cow, Horse, Pig, and Dolphin?
4. Explain the production of the anomalous postœsophageal right subclavian artery sometimes found in man.
5. What changes take place in the development of the following parts in the two human sexes?—

(a). Müllerian Duct.
(b). Wolffian Duct.
(c). Wolffian Body.
6. What are the essential characteristics of the duodenum in mammals?
7. What do you know regarding the zoological distribution of the following parts?—

(a). Vermiform Appendix.
(b). Diverticulum Vateri.
(c). Hepato-cystic Ducts.
(d). Bursa Entiana.

8. Describe the following arrangements as met with in the human body :—

- (a). The tympanic pouches of Tröltsch.
- (b). The bursæ of Gerlach and Hagen.
- (c). The ligamentum pterygo-spinosum of Civinini.
- (d). The Concha Santoriniana.

9. What is the Jacobsonian organ, and where is it developed?

10. Give the localities of the following sulci in the brain :—

- | | |
|------------------------|------------------------------|
| (a). Calcarine. | (d). Rolandian. |
| (b). Collateral. | (e). Sylvian. |
| (c). Calloso-marginal. | (f). Internal perpendicular. |

BOTANY.

DR. R. PERCEVAL WRIGHT.

1. Enumerate the suborders of Ranunculaceæ, and give the diagnosis of each.

2. Give examples of persistent calyx.

3. Mention the chief forms of irregular gamo and poly-petalous corollas.

4. Give examples of monandrous and deandrous native Plants.

5. Describe the inflorescence of the Hazel or Oak.

6. Mention some cases of normal adhesion of stamens.

7. Mention the fruits included under the thin and thick skinned Berries.

8. Describe the modes in which the Cotyledons are folded in the Cruciferæ.

9. Describe the reproduction in any of the Thallogamia.

10. Describe the Plant on the table.

SCIENCE SIZARSHIP EXAMINATION.

GEOMETRY.

DR. TRAILL.

1. Four lines drawn at random form four triangles, prove ;

(a). That the circumscribing circles of these triangles intersect in the same point O.

(b). That the centres of these four circles lie upon another circle, passing through the same point (O).

(c). That the four polar centres or points of intersection of the perpendiculars of these four triangles lie upon a right line (L).

(d). That this right line (L) is parallel to the line joining the feet of the perpendiculars from O on the four given lines, and equally distant with O from that line.

(e). That the circles described on the diagonals (as diameters) of the complete quadrilateral formed by the four lines, are coaxal, and cut at right angles the four polar circles of the triangles, which are also coaxal but of an opposite species from the former system.

2. In any triangle (ABC) if O be the inscribed circle, $O' O'' O'''$ the three escribed circles, and Σ the 'nine point' circle, prove ;

(a). That Σ touches the four circles O, O', O'', O''' .

(b). That the four triangles formed by connecting the four points of contact, are in perspective with the triangle ABC .

(c). If the triangle ABC be right angled, prove directly that the circle described on the bisector of the base as diameter, touches the inscribed circle.

3. If A, B, C , be three circles, P, Q, R , their three circles of similitude, D and D', E and E', F and F' , their three pairs of circles of anti-similitude, prove that the circle O which is orthogonal to the circles A, B, C , is also orthogonal to the other nine circles.

4. Prove the following theorem, and find the result of inverting it from any origin.

"The rectangles under the distances of any pair of inverse points with regard to a circle, from any other pair on the same diameter are as their distances from the centre of the circle."

5. If A and A' be triangles reciprocal polars of each other with respect to a circle whose centre is O , and radius r , and if a, b, c , be the triangles subtended at O , by the sides of A , and a', b', c' , the triangles subtended at O , by the sides of A' , prove that,

$$A' = \frac{A^2 r^4}{4abc} \text{ and } A = \frac{A'^2 r^4}{4a'b'c'}.$$

and find the locus of O , if the triangles A and A' be similar.

6. Every circle (O) which intersects two given circles at constant angles, cuts each circle coaxal with them at a constant angle. Prove this, and show how to find the particular circle of the system which is cut orthogonally, and the two particular circles of the system which are touched by the same circle O .

7. If four pairs of points A and A', B and B', C and C', D and D' , on any right line be such, that any two corresponding constituents may be interchanged without violating the relation of equianharmonicism, then every two corresponding constituents may be similarly interchanged. Prove this, and show that in such case the four intervals AA', BB', CC', DD' , have a common interval MN , dividing them harmonically.

8. Construct a triangle of given species, whose sides shall touch three given circles, and whose area is given or a maximum.

ALGEBRA.

MR. WILLIAMSON.

1. Assuming the Binomial Theorem when the index is an integer, prove it generally.

Apply it to find the general term of the expansion of $(1-x)^{\frac{1}{2}}$.

2. Solve for x, y, z , from the three simultaneous equations,

$$\frac{x}{\lambda} + \frac{y}{\lambda-a} + \frac{z}{\lambda-b} = 1,$$

$$\frac{x}{\mu} + \frac{y}{\mu-a} + \frac{z}{\mu-b} = 1,$$

$$\frac{x}{\nu} + \frac{y}{\nu-a} + \frac{z}{\nu-b} = 1.$$

3. Find the value of

$$\frac{a^2+bc}{b+c} + \frac{b^2+ac}{a+c} + \frac{c^2+ab}{a+b},$$

where a, b, c are the roots of the cubic

$$x^3 + px^2 + qx + r = 0.$$

4. Decompose into its partial fractions the expression

$$\frac{1}{x^6 - 1}.$$

5. Find the values of the quadratic factors of the expression

$$x^{2m} - 2a^n x^n \cos \theta + a^{2n} = 0.$$

6. Give the definition of the logarithm of a number, to a given base; and point out the advantages of a system of logarithms to the base 10.

Prove the formula

$$\log_a (1+x) = \log_a e \left\{ x - \frac{x^2}{2} + \frac{x^3}{3} - \&c. \right\}.$$

7. If $\alpha, \beta, \gamma, \delta$ be the roots of the biquadratic

$$x^4 + px^3 + qx^2 + rx + s = 0,$$

find the value of the determinant

$$\begin{vmatrix} \alpha & \beta & \gamma & \delta \\ \alpha^3 & \beta^3 & \gamma^3 & \delta^3 \\ \alpha^4 & \beta^4 & \gamma^4 & \delta^4 \\ \alpha^5 & \beta^5 & \gamma^5 & \delta^5 \end{vmatrix}$$

in terms of the coefficients in the equation.

8. Solve the equation

$$x^6 - x^5 - 8x^4 + 2x^3 + 21x^2 - 9x - 54 = 0,$$

being given that $\sqrt{2} + \sqrt{-1}$ is a root,

9. Explain Newton's method of finding the sums of the powers of the roots of an equation, and apply it to find the sum of the 5th powers in the equation

$$x^4 - 2x^3 + 7x^2 - 3x + 6 = 0.$$

10. Find the greatest and least values of the fraction

$$\frac{2x^2 + 12x + 15}{x^2 + 4x + 5}.$$

11. Find the condition that the roots of the cubic $x(x - 3a)^2 = b^3$ should be all real.

TRIGONOMETRY.

MR. PANTON.

1. If the angles of a plane triangle are connected by the relation

$$l \sin A + m \sin B + n \sin C = 0,$$

prove

$$\frac{m^2 + n^2 + 2mn \cos A}{a^2} = \frac{n^2 + l^2 + 2nl \cos B}{b^2} = \frac{l^2 + m^2 + 2lm \cos C}{c^2}.$$

2. Eliminate θ from the equations

$$a \cos 2\theta + b \sin 2\theta = c,$$

$$a' \cos \theta + b' \sin \theta = c'.$$

3. Prove the formula

$$\frac{\pi}{4} = 4 \tan^{-1} \frac{1}{5} - \tan^{-1} \frac{1}{239},$$

and show how it is to be employed for approximating to the numerical value of π .

4. Find the sum to n terms, and to infinity, of the series

$$x \sin \theta + x^2 \sin 2\theta + x^3 \sin 3\theta + \dots$$

5. Prove the expansion

$$\tan^{-1} \frac{a \sin 2\theta}{1 - a \cos 2\theta} = a \sin 2\theta + \frac{1}{3} a^3 \sin 4\theta + \frac{1}{5} a^5 \sin 6\theta + \dots$$

6. If a quadrilateral is inscribable in a circle, find expressions in terms of the sides for the area of the quadrilateral and the radius of its circumscribing circle.

7. If the sides of a spherical triangle are small in comparison with the radius of the sphere, show that the angles of a plane triangle whose sides are equal in length to the sides of the spherical triangle are approximately equal to the angles of the spherical triangle diminished each by one-third of the spherical excess.

3. Prove the formula

$$\tan r \tan R = \frac{2 \sin \frac{1}{2}a \sin \frac{1}{2}b \sin \frac{1}{2}c}{\sin \frac{1}{2}(a+b+c)},$$

where r, R are the radii of the inscribed and circumscribed circles of a spherical triangle.

9. Given the base of a spherical triangle, and the ratio of the sines of its semi-sides; find the locus of its vertex.

10. Given the four sides and the two diagonals of a spherical quadrilateral, find an expression for the cosine of the arc joining the middle points of the diagonals; and derive from it the corresponding expression for a plane quadrilateral.

1. From the top of a house 63 feet high, the angle of elevation of a steeple is observed to be $14^{\circ} 12' 35''$, and from bottom to be $23^{\circ} 18' 20''$; find the height of the steeple.

2. Investigate a formula for the logarithmic calculation of the third side of a triangle when two sides and included angle are given, and apply it to the case

$$a = 562, \quad b = 320, \quad C = 128^{\circ} 4'.$$

3. The sides of a spherical triangle are

$$76^{\circ} 35' 36'', \quad 50^{\circ} 10' 30'', \quad 40^{\circ} 0' 10'';$$

calculate the spherical excess.

4. Given in a spherical triangle,

$$A = 23^{\circ} 27' 42'', \quad C = 90^{\circ}, \quad b = 10^{\circ} 39' 40'';$$

calculate c, a , and B .

5. Given the angles of a spherical triangle,

$$A = 43^{\circ} 18', \quad B = 74^{\circ} 10', \quad C = 98^{\circ} 32';$$

calculate the side a .

If the radius of the sphere be 10 feet, find the area of this triangle in square feet.

6. If a, b, c be three consecutive numbers, prove

$$\log_e b = \frac{1}{2} \log_e a + \frac{1}{2} \log_e c + \left\{ \frac{1}{2ac + 1} + \frac{1}{2} \left(\frac{1}{2ac + 1} \right)^3 + \dots \right\};$$

and explain why this formula is suitable for the calculation of the logarithms of large prime numbers.

IRISH SIZARSHIP EXAMINATION.

PROFESSOR O'MAHONY.

Translate the following passages from Greek into Irish :—

- I. Matt. xv. 21-28. II. Luke, xviii. 1-8.

Translate the following passages from English into Irish :—

- I. Mark, xiv. 43-50. II. John, vi. 15-21.

Translate the following passages into English :—

I.

Do ghní an Spioradpra fiaðnuirí le ar rriopuibne, gup claí do Dia ríí :

A gup máir claí, ir oíóiríge fód [ríí] ; oíóiríge [gan aínarar] do Dia, a gup cómóiríge do Críofó ; má fúilngemís a néinfeadó nír, ionúr go mbéimír a cómóiríge [nír].

'Oir méarum naó riu na néite fúilngemís ra naimrírre a látar an glóir fúilngemís doíí.

'Oir acá reítearí díódealláó gaó creatúr ag fúiréadó ré fúilngemís doíí.

'Oir acá an creatúr fá murrantadó an díomáoirí, ní d'a toil féin, acó air fon an té do óuir fá murrantadó [é].

A muirígin go raorruíde an creatúr féin ó fúiríde na cruailídeadó go raorruí glóir doíí.

II.

'Oir ní óum an tpleíde éangabair ré a bfeádear cumailc, ná óum an tmeadó larpága, na óum na rúoirme, ná an doiréaduír, ná an gairbíriam,

Na óum fúaimc na rúice, na góca na mbriatár ; ag ar fúiréad an dpeam do óualuís é d'atóuínge gan an briatár do lábairc riu féin ní ra mío :

(Oir níor d'fúirí riu an níó do bí air na aínne díó d'iomóur, a gup, d'a mbeanuís riu a naimríde féin nír an tpleíde, gádear do óóduís air no gáduís ré a tolláó ré gá :

A gup do bí an níó do óóicabair cómúatbapáó rín, [go] ndú-bairc Maoiré, acáim lán d'fúitdear í do óríc ;)

Acó ar óum pléide Síom acá ríó air dteadó, a gup óum cáit-readó Dé bí, [óum] na h'leiríaleam neamhá, í óum cuideadó na mílteadó aíngeal,

A gup óum an cómóiríge gineapalca a gup eazluir gáca óóiríge, noó acá rúiríde air neam, í óum Dé bfeítearí na nuile, í óum rriopadó na bfeítearí ndiongmáilca,

A gup óum 'lora eirírméadonóir na óiomna nuairé, óum na pola do óraíteadó, lábairc néite ar fúirí na [é rín] Abail.

SCHOOL OF ENGINEERING.

MIDDLE CLASS.

DR. DOWNING.

1. The base lines of a railway survey intersect at an angle of $141^{\circ} 36'$ and have to be connected by a curve of 27 statute chains radius, compute,

- (a). The tangent length in chains.
- (b). The length of the arc in chains.
- (c). The *secant point*.

2 (d). Compute the angle in the circumference subtended by the chain as chord, and give the proof of the formula you employ.

(e). The springing point of the curve being at 213.58 chains, compute the angle for the 1st odd distance, and for the 2nd odd distance on leaving the curve.

3. The centre line of an intended railway intersects a road on a curve of 20 statute chains. The chain pegs fall in the fields on either side. How do you obtain the axis of the railway and the axis of the road; in the answer give the necessary computations?

4. Explain Bidder's Tables, and show how you employ them when the excavation or embankment has to be divided into unequal portions and lengths greater than that in the tables.

And again, if the heights be greater than those in the table, how do you proceed? thus, let the end heights be 120 and 84; compute the number of cubic yards.

5. To find the square yards in both sides of an excavation or embankment a short additional table is given of which the following is an extract:—

Slopes $\frac{1}{4}$ to 1	6.184
—— $1\frac{1}{4}$ to 1	10.818
—— $2\frac{1}{4}$ to 1	16.155

How are these numbers obtained, and how employed, thus with end heights of 20 feet and 30 feet, what is the area of the slopes on both sides?

6. A semicircular arch with a radius of 10 feet, and a distance of 15 feet 3 inches from the soffit to the level of the road carries a railway over a public carriage road, does it or does it not comply with the 8th Vict. chap. 20, and in what particulars?

7. In a semicircular oblique bridge we have the intersection of the two axes 38° and the radius 15 feet. Compute the axial length, and the angle β which the coursing joints make with the horizontal at the abutment, and also the obliquity of the bridge.

8. Compute the volume of water flowing down a channel with the following data. The section is a trapezium, the breadth at the water surface being 70 feet, and at the bottom 54 feet, the depth is 6 feet, and the inclination one in 12,000. The answer to be in cubic feet per minute.

9. It is required at a part of the course to build vertical walls instead of the sloping banks; the same depth, velocity and inclination as above being retained, what must now be the breadth of the channel?

What is the velocity in feet, per second, at the surface and at the bottom in the above water-course?

10. What number of gallons per diem can be conveyed to a town by a cast iron pipe, 21 inches in diameter, and having a fall of 12 feet per mile, and at the end of the fourth mile of its course, what would be the pressure per square inch on the interior of the pipe, and what the bursting force tending to split it longitudinally?

11. If double the supply were required, what would be the diameter of the pipe, the rate of inclination being supposed unaltered? Compare the quantities of metal in the two cases.

12. If the area of the rain basin supplying a reservoir be 21,500 acres, and the available rainfall be 19 inches per annum; what number of gallons per diem can this give to a town, and fully prove the rule for computing it given you? Explain what is meant by the available rainfall?

13. Describe the construction of Bateman's rain gauge, and of some of the other forms of this instrument, and note the difference in their application, as connected with these different details. What are the several points which should be looked into in placing them?

14. A weir for gauging the supply to a town has a length of 12 feet, and a depth of water on the edge or crest of six inches, what number of gallons per diem is passing down?

15. If double the quantity passed down, what would now be the depth in inches on the crest? The coefficient must be taken in this and the former question for a fine edge of metal, and without appreciable velocity of approach in the water,

16. What is the true formula for the discharge of water through sluices and what the approximate, and show graphically the difference in the results, and also arithmetically in the case of a sluice open one ft. wide and one ft. high, the bottom sill of which is 9 ft. 6 in. below the surface of the water? The coefficient may be taken as equal to 0.62.

MR. LESLIE.

1. State the methods of finding the expansion of solids by heat, and mention any applications of this principle in the arts.

2. "Water has a point of maximum density"—how is this proved by experiment? What natural phenomena does this peculiarity account for?

3. Give the methods of finding the elastic force of vapours.

4. Describe Regnault's method of finding the tension of steam, and state the results established.
5. Mention the physical principles upon which the various modern freezing machines depend.
6. Describe any method of finding the mechanical equivalent of heat.
7. Deduce the formula for the relative volume of steam.
8. Show how to calculate the amount of mechanical force produced by the evaporation of a given quantity of water.
9. How would you determine the amount of work done by the expansion of steam?
10. State in general terms the theory of a double-acting steam engine.

MIDDLE AND JUNIOR CLASSES.

MECHANICS AND HYDROSTATICS.

MR. GALBRAITH.

1. A fly-wheel makes n revolutions in a minute: how do you express the quantity of work stored up in it?
2. Deduce the expression for the angular acceleration of a heavy body which revolves round a fixed axis.
3. A circular plate of iron, 12 inches in diameter and 3 inches thick, revolves round an axis in its periphery, and at right angles to its plane; find its weight, mass, centre of gyration, and centre of percussion; the specific weight of iron being 450 lbs. to the cubic foot.
4. If this plate falls from its position of unstable equilibrium, with what angular velocity will it arrive at its position of stable equilibrium?
5. Calculate the force of the blow which must be delivered horizontally through the centre in order to raise the plate to its highest position, also the shock on the axis.
6. Define the centre of pressure, and deduce an expression for its distance from the surface of the fluid.
7. If a circular plate of 1 foot radius be immersed vertically in a fluid with its centre 10 feet below the surface, find the position of the centre of pressure.
8. For a given mass of gas, prove that

$$\frac{\text{Volume} \times \text{Pressure}}{\text{Absolute Temperature}}$$

is constant.

9. From the last question, prove the following formula for the diving bell:

$$1 + \frac{w}{W} = \left(1 + \frac{x}{34} \right) \frac{V'T}{VT'}$$

in which W is the original weight, and w the additional weight of air forced into the bell, and x the number of feet between the levels of water at the surface and in the bell.

10. In a steam derrick crane, of which the jib is 40 feet, the tie-bar 30 feet, and the post 15 feet long, calculate the weight of the engine and boiler placed with its centre at a distance of 8 feet from the post, in order to balance 1 ton; also calculate the compression and tension of the jib and tie-bar.

CHEMISTRY AND MINERALOGY.

DR. APJOHN.

1. Write in separate groups the monad, dyad, triad, and tetrad metals.
2. Explain how you would decompose water so as to collect separately its oxygen and hydrogen.
3. Mention the gases which compose the atmosphere, and give the chemical processes by which each may be developed.
4. How is sulphide of hydrogen usually prepared, and what is its action upon acid solutions of ferrous chloride, and cupric sulphate?
5. Explain the action of carbonic anhydride on lime water.
6. How is ammonia made, and converted into the hydrate of ammonium? Give also the constitution of the compound which results from the saturation of the hydrate of ammonium with sulphide of hydrogen.
7. How is sulphurous anhydride made? Give also the reaction between it and iodine in the presence of water.
8. How would you prepare ferrous sulphate, and convert it into ferric sulphate? Mention also the reagents by which ferrous and ferric salts are distinguished from each other.

MR. W. ROBERTS.

1. Being given $\cos 2\theta = \frac{527}{625}$, and $\tan \phi = \frac{15}{112}$, find $\tan \frac{1}{2}(\theta + \phi)$.
2. In a triangle the base c is 10, and the angles A and B at the base are such that

$$\cos 2A = \frac{11}{61}, \quad \cos 2B = \frac{33}{65};$$
 it is required to find the area.
3. Being given in a triangle $a = 565.43$, $b = 734.15$, $C = 77^\circ 43' 50''$, find the value of $\cos A + \cos B + \cos C$.
4. Find the angles of the triangle the sides of which are given as follows: $a = 3898$, $b = 6557$, $c = 9715$.

5. P is a point in the side AC of a triangle ABC : being given that $AP = 5482$, $CP = 455$, $ABP = 39^\circ 23' 4''$, $CBP = 19^\circ 40''$, it is required to calculate AB , BC , BP .

6. Five equidistant ordinates, $1, a, a^2, a^3, a^4$, are given, where $a = .9$. With an interval of .5, compute the area.

7. If $u = \frac{4x - 11}{2(x - 2)^2} + \log(x - 2)$, find $\frac{du}{dx}$.

8. Expand $(1 - x)^{-2}$ by Maclaurin's theorem.

9. Being given in magnitude the two sides a, b of a triangle: if the third side c , multiplied by the square of the perpendicular let fall from the angle C upon c , is the greatest possible, it is required to find the value of $\tan A \tan B$.

10. Find the value of $\cos x$, when $\sin 2x - \sin x$ is a maximum.

MR. W. ROBERTS.

1. Being given in a triangle, $a = 1000$, $b = 1982.8$, $C = 67^\circ 30' 40''$: calculate the ratio of the diameter of the inscribed circle to that of the circumscribed circle.

2. $ABCD$ is a quadrilateral, of which AD, BC are the diagonals: being given $AB = 1000$, and $BAC = 19^\circ 13' 42''$, $BAD = 14^\circ 46' 34''$, $ABD = 59^\circ 28' 18''$, $ABC = 31^\circ 24' 12''$, it is required to calculate CD .

3. The base of a cylinder is a circle whose area is equal to the surface of a sphere, of radius 5 ft.: being given that the volume of the cylinder is equal to the sum of the volumes of two spheres of radii 9 ft. and 16 ft., find the height of the cylinder.

4. A solid sector is cut out of a sphere of 10 ft. radius by a cone the angle of which is 120° : find the radius of the sphere whose solid contents are equal to those of the sector.

5. Two cones have a common base, the radius of which is 12 ft.; the altitude of one is 9 ft., and that of the other is 5 ft. Find the radius of a sphere whose entire surface is equal to the sum of the areas of the cones.

6. Find the ratio of the entire area of the hypocycloid whose equation is $x^{\frac{2}{3}} + y^{\frac{2}{3}} = a^{\frac{2}{3}}$ to the area of the circle whose radius is a .

7. Find the values of the definite integrals,

$$\int_0^{\frac{\pi}{2}} \cos^4 x dx, \quad \int_0^{\frac{\pi}{2}} \cos^5 x dx.$$

8. Exhibit the most general solution of the following problem in descriptive geometry: to draw through a given point a plane parallel to a given plane.

EXAMINATION FOR DEGREE OF LL. B.

DR. WEBB.

1. State the analogy between a Law in the proper signification of the term, and a so-called Law set by general opinion.
 2. Sanctions, according to Austin, are of three capital classes? What is the meaning annexed by Bentham to the expression 'physical sanction'?
 3. What is Austin's comment on the proposition 'might is right'?
 4. Give Paley's version of the theory of Utility.
 5. Trace the growth of the law of Contracts as traced by Sir Henry Maine.
 6. Why does Bentham refuse to rank Liberty among the principal objects of Law?
 7. Contrast the Principle of Utility with the Ascetic Principle, and with the Arbitrary Principle.
 8. Point out the principal juridical characteristics of Archaic Societies.
 9. Show the points of contact and of contrast which subsist between Contract and Conveyance.
 10. State the principal doctrines of the Law of *Principal* and *Surety* as derived from the Civil Law.
 11. Compare the doctrines of the Common Law with those of the Civil Law with respect to *Wills*.
 12. Distinguish between the different kinds of *Agency*.
-

DR. WEBB.

1. What is the duty of neutral nations in the event of a war between two portions of a State?
2. The Turkish difficulty of 1839 and 1840 is worthy of a prominent place in modern history?
3. What are the principal duties of a British Consul?
4. State the principal differences between the English and the Scotch Law of Marriage.
5. What was decided in the case of the *Queen v. Milles*?
6. What was the last trace of *Villénage* in the British Islands?

UNDERGRADUATE PRIZE EXAMINATION PAPERS

Michaelmas Term.

JUNIOR SOPHISTERS.

Mathematics.

A.

MR. WILLIAMSON.

1. A body sliding down a plane of 45° inclination passes over 20 feet in four seconds; find the coefficient of friction between the body and the plane.

2. If a cord be strained round a smooth plane curve, prove that the normal pressure at any point varies directly as the tension of the string, and inversely as the radius of curvature at the point.

3. State what is meant by the equation of time, and show that it vanishes four times in the year.

4. Explain clearly the lunar method of finding the longitude at sea, and determine approximately the error in the ship's place, arising from an error of one minute in the computed position of the moon.

5. In refraction through a lens, give an accurate proof of the formula

$$\frac{1}{d} - \frac{1}{D} = (\mu - 1) \left(\frac{1}{r} - \frac{1}{r'} \right).$$

6. Find an expression for the magnifying power in the Gregorian Telescope.

DR. TRAILL.

7. One end of a uniform beam rests on a smooth inclined plane, whose inclination to the horizon is 45° , and the other end lies on a rough horizontal plane, prove that if the coefficient of friction be less than $\frac{1}{2}$, no position of equilibrium is possible.

8. Find that point on the circumference of a vertical circle, from which the times of descent of a particle under the influence of gravity

shall be the same, down a radius to the centre, and down a chord to the lowest point of the circle.

9. Explain the *variation of the compass*, and describe the astronomical observation by which its amount at any given place is determined.

10. Show how the height of a lunar mountain may be ascertained, and prove the following expression for it

$$H = \frac{t^3}{2r \sin^3 e},$$

where t is the observed distance of the top of the mountain from the circle of light and darkness, r the radius of the moon, and e the angle of elongation of the moon from the sun.

11. A certain liquid is poured on a watch glass whose curvature is 6.5 inches, and a beam of parallel rays falling on the surface of the liquid is brought to a focus at a distance of 15 inches. Determine which of the following liquids it is, their refractive indices being given:—

Alcohol,	. . .	1.372
Water,	. . .	1.336
Sulphuric acid,	. .	1.433
Nitric acid,	. .	1.410

12. Adopting the standards of the metric system, prove the following formula connecting the volumes of any mass of gas at different pressures and temperatures:—

$$V' = V \cdot \frac{273 + t'}{273 + t} \cdot \frac{p}{p'}.$$

MR. PANTON.

13. Explain the effect of the velocity of light upon the apparent positions of the fixed stars, and prove

$$\text{aberration} = k \sin (\text{earth's way}).$$

Assuming that light takes 8 min. 18 secs. to travel from the sun to the earth; find the numerical value of k .

14. Given the sun's altitude when due east, and also at 6 o'clock; find the latitude of the place.

15. Find the velocity and angle of projection of a heavy particle so that it may pass through two given points in the plane of projection.

16. A weight is supported on an inclined plane by three forces, each equal to one-third of the weight, one acting vertically upwards, another along the plane, and the third horizontally. Find the angle of inclination of the plane, and the pressure on the plane.

17. Find the angle at which a prism of given substance should be cut so that light, incident at an angle equal to twice the angle of the prism, should pass out without refraction at the second surface.

18. A vertical cylinder one foot in height and one foot in diameter is filled with water, and closed by a heavy piston weighing 4 lbs.; find the whole pressure on its curved surface.

B.

MR. WILLIAMSON.

1. A cone is attached to a horizontal axis, passing through its vertex and at right angles to its axis. If it be let fall from the position in which its axis is horizontal, find its angular velocity when at its lowest position.

Find also the pressure on the fixed axis, arising from centrifugal force, at the lowest position.

2. If the force in a central orbit be represented by $\frac{\mu}{r^2} + \frac{\mu'}{r^3}$, investigate the equation of the orbit; and find when it is a closed curve, and when not.

3. Find the law of force round the pole, the equation of the orbit being

$$r^{\frac{3}{2}} = a^{\frac{3}{2}} \cos \frac{3}{2} \theta.$$

4. Determine the effect of aberration on the right ascension, and the declination, of a star.

5. A uniform beam rests against a rough wall; if the coefficient of friction be the same for the ground and the wall, find the magnitude of the greatest weight which can be placed on the top of the beam without its slipping.

6. Explain the construction of the *diver's lens*; and show how its focal length is determined.

DR. TRAILL.

7. Prove that the errors in right ascension and declination caused by the parallax of a heavenly body, are equal respectively to

$$P \cdot \frac{\cos l \sin (h + a)}{\cos \delta}, \text{ and}$$

$$P \cdot \{ \sin l \cdot \cos \delta - \cos l \cdot \sin \delta \cdot \cos (h + a) \},$$

where P is the horizontal parallax; and prove that the parallax at any zenith distance is given by the series,

$$p = \sin P \cdot \sin s + \frac{1}{2} \sin^2 P \cdot \sin 2s + \frac{1}{6} \sin^3 P \cdot \sin 3s + \&c.$$

8. A ball of elasticity e , is projected from a point between two vertical planes which are parallel to each other, and perpendicular to the plane of projection, prove that the *latera recta* of the parabolic arcs described are in geometrical progression, their common ratio being e^2 .

9. How does Newton investigate the following problem?—

A body revolves in the circumference of a circle, find the law of force, by which it is attracted to a given point.

10. Show that the measure of the stability of a floating body depends on the sign of the quantity

$$\left(\frac{I}{V} - \lambda \right)$$

where I is the moment of inertia of the plane of floatation, V the quantity of the fluid displaced, and λ the distance between the centres of gravity of the body and the fluid displaced.

Determine the condition of stability in the case of a cone floating with its vertex downwards.

11. If ρ and ρ' be the distances of the foci of incident and refracted rays from the point of incidence of a ray of light on any surface, whose radius of curvature in the plane of incidence is r , and if θ and θ' be the angles of incidence and of refraction, prove the following relation:—

$$\left(\frac{\sin \theta}{\rho} + \frac{\sin \theta'}{\rho'} \right) - \left(\frac{1}{\rho \sin \theta} + \frac{1}{\rho' \sin \theta'} \right) = \frac{\cot \theta - \cot \theta'}{r}$$

12. Show that a combination of a convex and a concave lens may be made achromatic for the extreme red and violet rays, by separating them to a distance (δ) given by the equation

$$\delta + f = \sqrt{pff'}$$

where f and f' are the focal lengths of the lenses, and p the ratio of their dispersive powers.

Explain why such a combination is not necessarily achromatic for intermediate or green rays, and show how complete achromatism can be secured.

MR. PANTON.

13. A square lamina floats with its plane vertical, and one angular point below the surface of the liquid; find all its positions of equilibrium.

14. A transit instrument moves in a vertical plane slightly deviating from the meridian. Show how the amount of deviation may be found by observing the transits of two known stars, and determine what stars are most suitable for the observation.

15. Prove that the general polar differential equation of the path of a ray of light through the earth's atmosphere, the centre of the earth being the origin, is

$$\left(\frac{du}{d\theta} \right)^2 + u^2 = C \mu^2;$$

where μ is the index of refraction of the atmosphere at a distance r from the centre, and C is a constant.

Find the equation of the path when $\mu = \frac{A}{r} + B$.

16. Given the velocity and direction of projection of a body from a given point round a centre of force varying inversely as the square of the distance; determine the axis major, the position of the axis, and the eccentricity of the orbit described.

17. One vertical side of an open cubical vessel is moveable round a hinge at the bottom. This side is held till the vessel is filled with a liquid, and is then turned inwards till it assumes a position of equilibrium under the action of its own weight and the pressure of the fluid. It is required to find an equation for determining the weight of liquid

which remains in the vessel in terms of the original weight and the weight of the side of the vessel.

18. Given the law of force under which an orbit may be described round one centre, how does Newton derive the law round any other?

Hence prove that the law of force under which a body will describe an ellipse round any internal point varies directly as the distance from the point, and inversely as the cube of the perpendicular on the polar of the point.

Classics.

MR. MAHAFFY.

Translate the following passages :—

1. *Beginning*, τέλειαι γὰρ παλαίφατοι ἀραί, κ. τ. λ.
Ending, καμψίπους Ἑριννύς.
2. *Beginning*, ΧΟΡ. ὁτοτοὶ βασιλεῦ στρατιᾶς ἀγαθῆς, κ. τ. λ.
Ending, κακὸν ἄρ' ἐγενόμαν.

Beginning, ἀνήλιοι βροτοστυγεῖς, κ. τ. λ.
Ending, παναρκείτας νόσου βρύειν.

4. *Beginning*, τοιαῦτα δρῶσιν οἱ νεώτεροι θεοὶ, κ. τ. λ.
Ending, μιδστορ' ἀντ' ἐμοῦ πείσεται.

1. Compare the women of Æschylus with those of Sophocles and Euripides.

2. What modern poets have imitated Æschylus, and with what success?

3. Discuss the criticisms of Æschylus made by Aristophanes in the *Frogs*.

4. Compare his theology with that of earlier Greek poets.

5. What features in Greek tragedy are due to the construction of the theatres?

Translate :—

- (1). χάριτες δ' ὁμοίως
κέκληνται γόος εὐκλεῆς προσθοδόμοις Ἀτρεΐδαις.
- (2). οὐκ ἀτρίακτος ἄτα;
- (3). τὸ μὴ θέμις γὰρ οὐ
λάξ πέδον πατούμενον
τὸ πᾶν Διὸς σίβας παρέκβαντες οὐ θεμιστῶς.
- (4). κορκορυγαὶ ὅ' ἀν' ἄστν, ποτὶ δ' ὀρκάνα πυργῶτις.

LUCRETIVS

MR. POOLE.

Translate all the following passages into English prose:—

1. *Beginning*, Porro si nullast frangendis reddita finis,
Ending, Quanam sit ratione atque alte terminus haerens.
 Lib. i. 577-597.
2. *Beginning*, Denique quae nobis durata ac spissa videntur,
Ending, Non e perplexis sed acutis esse elementis.
 Lib. ii. 444-464.
3. *Beginning*, Haec igitur tantis ubi morbis corpore in ipso
Ending, Mittit, uti docui, seu flectitur a medicina.
 Lib. iii. 506-523.
4. *Beginning*, Exultare etiam Samothracia ferrea vidi
Ending, Ligna materies in quo genere esse videtur.
 Lib. vi. 1044-1062.

1. Give some account of the great Dacian campaigns of Trajan, and state the remarkable proof of the effects produced by them.
2. Describe the remarkable outbreak of the Jews in the second century, and state the localities where it chiefly occurred.
3. How were the legions employed under the Empire? and contrast them with the earlier Roman forces, pointing out the consequent political results.
4. What, according to Merivale, are the differing characteristics of the poems of Lucian and of Silius Italicus; and to what does he trace them?
5. To what circumstances of his times does Mommsen attribute the prominent conceptions of Lucretius?
6. How does Munro ingeniously trace a single archetype for the best MSS. of Lucretius?
7. On what grounds does Lucretius argue that there must be "exiguum clinamen principiorum"?
8. How does he reason from the circumstances which cause pleasure and pain that atoms are devoid of all sense?
9. Munro contrasts Lucretius with Catullus as to the Greek authors whom he has followed in his composition?
10. What rules does Munro lay down as to the structure of those lines in Lucretius in which the two first feet are separated from the following words?
- 11a. Write an explanatory note on the line

"Æraque quae claustris restantia vociferantur."

- b. Write a note on the senses given to the word "vesca," and show how far these senses may be supported from passages in other authors.

12. Quote parallels from other authors for the following passages :—

“Atque omne immensum peragravit mente animoque.”

“In curru bijugos agitare leones.”

a. And for the particular use of the words in italics in the following :

“Et infinito *cita* corpora materiali.”

“*genitabilis* aura Favoni.”

MR. ABBOTT.

Translate the following into Greek Prose :—

He is (as Aristotle expresseth it) at variance with himself. He is neither brute enough to enjoy his appetites, nor man enough to govern them. He knows and feels that what he pursues is not his true good, his reflection serving only to show him that misery which his habitual sloth and indolence will not suffer him to remedy. At length being grown odious to himself, and abhorring his own company, he runs into every idle assembly, not from the hopes of pleasure, but merely to respite the pain of his own mind. Listless and uneasy at the present, he hath no delight in reflecting on what is past, or in the prospect of anything to come.—BERKELEY.

Translate the following passage into Latin prose :—

It is not to be doubted, but to such a brave and warlike nation as the Gauls, among whom one constant maxim was universally followed, as we shall see in the sequel, to prefer the worst of deaths to the loss of liberty, the Roman yoke must appear intolerable; and that they could not be expected to submit to it longer than they were compelled by the superior power of their tyrants: and as these made it their constant practice to introduce, either by fair or foul means, their religion, laws, and customs; wherever they conquered, the druids, tenacious as they were of their own, could not but be extremely averse to all such changes, and use all their power and authority, which was still very great, and almost uncontrollable, either to oppose them, or to prevail on the people to shake off the yoke.

Translate the following passage into Latin verse :—

See the young, the rosy Spring,
Gives to the breeze her spangled wing;
While virgin Graces, warm with May,
Fling roses o'er her dewy way!
The murmuring billows of the deep
Have languish'd into silent sleep;
And mark! the flitting sea-birds lave
Their plumes in the reflecting wave;

While cranes from hoary winter fly
 To flutter in a kinder sky.
 Now the genial star of day
 Dissolves the murky clouds away ;
 And cultured field, and winding stream,
 Are sweetly tissued by his beam.
 Now the earth prolific swells
 With leafy buds and flowery bells ;
 Gemming shoots the olive twine,
 Clusters ripe festoon the vine ;
 All along the branches creeping,
 Through the velvet foliage peeping,
 Little infant fruits we see
 Nursing into luxury !

Translate the following passage into Greek Tragic Trimeters :—

But minutes speed—night gems the skies—
 And oh ! how soon, ye blessed eyes,
 That look from heaven, ye may behold
 Sights that will turn your star-fires cold.
 Breathless with awe, impatience, hope,
 The maiden sees the veteran group
 Her litter silently prepare,
 And lay it at her trembling feet ;—
 And now the youth, with gentle care,
 Hath placed her in the shelter'd seat,
 And press'd her hand—that lingering press
 Of hands, that for the last time sever ;
 Of hearts, whose pulse of happiness,
 When that hold breaks, is dead for ever.
 And yet to *her* this sad caress
 Gives hope—so fondly hope can err.
 'Twas joy, she thought, joy's mute excess—
 Their happy flight's dear harbinger ;
 'Twas warmth—assurance—tenderness—
 'Twas anything but leaving her.

"Haste, haste!" she cried, "the clouds grow dark,
 But still, e'er night, we'll reach the bark ;
 And by to-morrow's dawn—oh, bliss!
 With thee upon the sunbright deep,
 Far off, I'll but remember this,
 As some dark vanish'd dream of sleep."

Metaphysics.

DR. STUBBS.

1. Mansel states that the sciences of Geometry and Arithmetic present two important features of distinction.
2. The general assertion that all sensible qualities belong to a subject cannot be called either a Principle of necessary truth or a Fundamental law of human belief.
3. In order to place beyond question the existence of minds, Divine and human, Berkeley used two arguments, one derived from the Cartesian philosophy, the other added by himself.
4. It is not an imperfection in a syllogism that the premises necessarily imply the conclusion; this is shown by the nature of Logic and of Psychology.
5. Mill states that there are two kinds of propositions which assert uniformity of existence between properties; to what may each be reduced?
6. What are the cases in which reasonings depending on approximate generalizations, may be carried to any length with as much certainty as if they were universal laws of nature?
7. A derivative law, which we know how to resolve, is susceptible of a greater extension to cases adjacent in place than a merely empiric law, on two grounds. What examples does Mill give?
8. In heteropathic effects there is a certain peculiarity which assists us in the investigation. Why does it assist? In what cases is it not applicable?

SCHWEGLER.

DR. SHAW.

1. Schwegler divides the early history of Greek Philosophy into two periods; the analytic and the synthetic. Give the name and fundamental principles of the philosophers in each period.
2. Quote and comment on some of the "dark sayings" of Heracleitus.
3. How did the Hylicists pave the way for the Sophists?
4. The teaching of Socrates was largely influenced ("conditioned") partly by the systems of preceding philosophers, partly by the teaching prevalent in his own time. Show this.
5. In what respects, according to Schwegler, was the ethical teaching of Socrates incomplete.
6. Exhibit the "internal progress" of the Ideal Theory in the Megarie group of dialogues.
7. "The Platonic System," says Schwegler, "is a futile struggle against dualism." Why?

8. Important step taken by Aristotle toward the subjugation of the Platonic dualism.

9. Five peculiarities of the ethical theory of the Stoics followed from their principle, *sequi naturam*.

10. On what grounds does Schwegler regard Neo-Platonism as "the final gathering-in and at the same time the proof of the exhaustion of the ancient Philosophy"?

DR. TARLETON.

1. How does Hamilton show that Stewart's theory of the mode in which the cognition of external objects is produced is inconsistent with Natural Realism?

How does Imagination differ from Perception, according to Hamilton?

Hamilton's theory of Imagination might have been suggested by a passage which he quotes from Gassendi?

2. By what theory does Hamilton endeavour to account for the phenomena of Memory?

How is this theory applied to explain Forgetfulness, Distraction, Attention?

Schmid deduces a result from this theory with respect to feelings, volitions, and desires which seems opposed to experience?

3. How does Hamilton enumerate and describe the different acts of the Faculty of Comparison which take place in cognition?

From this description it appears that the relation between the Elaborative and Regulative Faculties with Hamilton is altogether different from that between the Understanding and the Reason with Kant?

How far is it true that Kant used the term Reason as equivalent to the Regulative Faculty of Hamilton?

4. What account is given by Hamilton of Kant's doctrine with respect to Pleasure and Pain?

5. How does Hamilton state the Law of the Conditioned, and from what instances does he endeavour to deduce its truth?

By what general principle does Kant explain the facts mentioned by Hamilton?

6. How far, according to Mill, is a metaphor of the nature of an argument?

How does he illustrate his theory from the statement, "Education is required by the mind, for if the soil is left uncultivated weeds will spring up"?

7. Under what heads does Mill class the following fallacies, and how does he refute them:—

The mind thinks always, because the essence of the mind is to think.

It is not true that man is governed by motives, for the man makes the motive, not the motive the man, since what is a strong motive to one man is no motive at all to another.

Whatever brings in money enriches. Money, therefore, should be attracted into the country, and kept there by prohibitions and bounties.

Prodigality, as giving great employment to labour, encourages industry, and parsimony is a discouragement to it.

Experimental Physics.

MR. CATHCART.

1. Deduce the expressions for vertical and horizontal components of terrestrial magnetism on the hypothesis of a small central magnet.
2. Compare this theory with actual facts.
3. Coulomb employed two methods to determine the distribution of free magnetism in a bar; describe each, and state the form in which Biot summed up the result.
4. In Kùlp's *compensation method* for comparing the strengths of two bar magnets, these quantities "are approximately as the cubes of the distance of the acting poles from the magnetic needle." Investigate this statement.
5. Give a sketch of the methods of correcting the compass indications for our ships. What is meant by sub-permanent magnetism?
6. State accurately the method of finding the magnetic inclination, the needle being very nearly balanced on its pivot.
7. What are the results arrived at by Coulomb and by Matteucci on the loss of electricity from a charged insulated body?
8. Meaning of *specific inductive capacity*? Faraday's method of measuring it, and results for air, gutta serena, glass, gases, sulphur?
9. How are Lichtenberg's figures produced? They furnish a means of examining the action of the electrophorus?
10. How has atmospheric electricity been examined, and what are the normal conditions?
11. What are Faraday's laws of electrolysis? What takes place in electrolysing water?
12. The most effective arrangement of cells has a resistance equal to that in the interpolar?
13. How is an induced current produced by means of the Leyden jar? Verdet has shown that it does not differ from that induced by the pile?
14. What is Siemen's unit of resistance, and what is its ratio to the Ohm?
15. How did Dr. Joule examine the heat produced in conductors by the current, and what laws did he arrive at?
16. What is the principle of Gramme's magneto-electric machine?

MR. LESLIE.

1. What is the principle by which the relative illuminating powers of different sources of light are compared, and how is Bunsen's photometer to be used in order to find the candle power of coal gas?

2. How is the minimum deviation of a ray of light produced by a prism determined theoretically, and how does it enable us to find refractive indices experimentally?

3. State accurately the astronomical observations from which it has been inferred that light is propagated with a finite velocity.

4. Describe the details of the experiments of Foucault and Fizeau in which the velocity of light was found by direct experiment.

5. What is meant by the *extraordinary index* of a doubly refracting crystal, and what is Huygens' construction for the direction of the extraordinary ray?

6. State the methods of arranging the experiments of Young and Fresnel on the interference of light, and show how the length of a wave of light may be experimentally determined from their results.

7. Find the positions of the exterior and interior diffraction fringes formed in the shadow of an opaque obstacle.

8. Give the general theory of the colours of thin plates, and account for the fact that Newton's rings commence from a dark centre.

9. Explain the advantages of using a prism instead of a lens in forming Newton's rings, and show that the rings may be made to commence either from a bright or a dark centre.

10. How is it shown experimentally that sound is produced by a vibration of the air, and what experiments prove that waves of sound are reflected and refracted like those of light?

11. State in detail the experiments which prove that *musical* sounds are produced by regular successions of similar sounds, and explain how the rapidity of the succession is experimentally found.

12. State the laws of vibration of strings, and explain the mode of proving them by means of a monochord.

13. Give examples of Chladni's method of determining the vibrations of elastic plates.

14. Account by theory for the phenomenon of resonance, and give experiments to illustrate it.

15. How may the state of vibration of the air in an organ pipe be found experimentally?

Natural Science.

ZOOLOGY.

DR. MACALISTER.

1. Describe the aberrant forms of Myriopoda.

2. What is the arrangement of the Pseudohæmal system in Echinidæ.

3. Describe the digestive canal in a lamellibranch Mollusc.

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4. Describe the provisional organs possessed by the embryos of Gastropoda, and contrast those of *Purpura* and *Limnæa*.
5. Describe the circulation in a Crocodile.
6. What are the characters of the shoulder-girdle of a monotrematous mammal?
7. Name some of the variations of the nerve centres in Cetacea.
8. Define Commensalism, and distinguish it from true parasitism.
9. Name the constituents of the leg in a bird.
10. What are the forms assumed by the Cochlea auris among Sauropsids?

BOTANY.

DR. E. PERCEVAL WRIGHT.

1. Enumerate the climatal zones of Meyen, giving the characteristic vegetation of each.
2. Mention some Plants having a very restricted geographical area.
3. Enumerate some Plants found native to Ireland, and not met with in Great Britain.
4. Mention the cell contents containing nitrogen.
5. Enumerate and describe the different forms of vessels.
6. State what you know as to the occurrence of Stomata.
7. Give some instances of regular and irregular Peloria.
8. Describe (a) Cell-division, and (b) Free Cell-formation.
9. Describe the Fruits met with in the Fig, Mulberry, Vine, and Strawberry.
10. Describe the floral whorls of the common Dog Rose.

Modern History.

PROFESSOR BARLOW.

A.

1. Write a short history of the reign of Christian II. of Denmark.
2. Give a full account of the events which led to the assassination of Wallenstein.
3. What were the main causes of the revolt of Catalonia (1640)? This insurrection led to an event of still greater importance to the Spanish monarchy?

4. What was the policy of Cardinal Richelieu after the death of Gustavus Adolphus ?

5. The death of the Emperor Ferdinand III. was followed by an interregnum of more than sixteen months. What were the causes of this ?

6. Give an account of the Dutch Revolution in 1672.

7. What was the truce of Vasvár (1664) ?

8. Give a full account of the dispute between the two Houses of Parliament about the case of Skinner and the East India Company.

9. Hallam gives the substance of two remarkable conversations between Cromwell and Whitelock, which seem to place beyond controversy the nature of Cromwell's designs on the Crown ?

10. How does Hallam explain the connexion of the popular party in Parliament with France in the year 1678 ?

B.

1. What were the troubles of Donauwörth ?

2. The inhabitants of Marseilles at one time gave the name of *Grenadines* to the Sardines. Why ?

3. Date of the accession of Gustavus Adolphus ?

4. By what treaty did he terminate the Russian War ?

5. When, and how, was Lorraine incorporated with France ?

6. Who was Masaniello ?

7. October 24, 1643, is for two reasons a memorable day in French history ?

8. Who was Charles X. of Sweden, and how did he become King ?

9. Cause of his expedition against Poland ?

10. Meaning of Cossacks of the *Ukraine* ?

11. Who was the Great Elector ? Date of his accession to the Electorate of Brandenburg ?

12. By what strange exploit was the Treaty of Roskilde (1658) brought about ?

13. "Selden, like the great Florentine astronomer, bent to the rod of power." What is Hallam speaking of here ?

14. Hallam mentions a circumstance that occurred in the Session of 1621 which proves the fanatical violence of the House of Commons ?

15. He compares Wentworth to Richelieu. In what respect ?

16. What was "Coat-and-conduct-money" ?

17. Hallam says, "Scarce any proceeding of the Long Parliament was more odious than this." What was this ?

18. The Trial of Sir George Wakeman, Physician to the Queen, was an important epoch in the history of the Popish Plot ?

19. Origin of the Habeas Corpus Act, according to Hallam ?

20. Who were the members of the Ecclesiastical Commission of 1686 ?

PROFESSOR DOWDEN.

1. What part did Colonel Hutchinson take in 1659 with respect to the oath of renunciation of the king ?
 2. Relate the conference of Hutchinson with Richard Cromwell.
 3. What was Hutchinson's conduct at Ireton's funeral ?
 4. Describe the assault on Shelford.
 5. What is the story of the Sentinel and my Lady Lambert ?
 6. State the chief facts relating to the Revenue in 1685.
 7. How does Macaulay sketch the characters of the members of the Cabal ?
 8. State what you know respecting agricultural wages and the wages of mechanics at the beginning of James II.'s reign.
 9. Give an account of the newspapers and newsletters of the same period.
 10. Give a brief account of the military system of England at the same period.
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1. In what year was Gregory King's computation of the population of England made ?
2. Number of the regular army in 1685 ?
3. Chief source of Macaulay's information respecting the navy in 1685 ?
4. How were the superior law courts chiefly supported ?
5. Average annual income of an English yeoman in 1685 ?
6. To whom was the power of the military forces of the city of London entrusted ?
7. When did the press become free from censorship ?
8. How are the names of Edward Heming and of William Dockwray remembered ?
9. At what court was the only English ambassador in the time of Charles II. ?
10. How did England obtain possession of Tangier ?
11. How did the following lords vote on the Exclusion Bill, 1680—Sunderland, Godolphin, Hyde, Essex, Halifax ?
12. When was the Declaration of Indulgence cancelled ?
13. From whom did Colonel Hutchinson seek information about the intentions of Monk ?
14. Mr. Hutchinson thought to obtain office in the Star Chamber. How ?
15. What countenanced the suspicion that the king favoured the rebellion in Ireland, 1641 ?
16. How did Hutchinson displease Cromwell in the matter of the governorship of Hull ?

17. On what suspicion was Hutchinson imprisoned, 1663?
18. Mr. Lenthall (son of the Speaker Lenthall) distinguished himself in 1660?
19. What persons were known as *Worsted-stocking Men*?
20. In what lay the special importance of Nottingham?

Modern Literature.

DR. ATKINSON.

1. "Les mots populaires sont faits avec l'oreille, les mots savants avec les yeux."

Explain and illustrate this statement.

2. In what Latin letters would you seek the origin of French *f, b, s, z, j*; and of all the (Fr.) diphthongs. Give examples of each.

3. Show the operation of apocope, prosthesis, transposition, and aphæresis in the formation of French words from Latin.

4. Write a chapter on the defective verbs in French.

5. What are the various ways of forming compound words?

6. What is the origin of these words:—guères, vinaigre, *quilt*, *constable*, aubépine, orfèvre, chauffer, venger, manger, bégueule, puiné, sourcil, *mischief*, *miscreant*, *essaim*.

Translate into French:—

It is more than probable that, in thus renouncing almost openly the ties of religion, honour, and morality, by which mankind at large feel themselves influenced, Louis sought to obtain great advantages in his negotiations with parties who might esteem themselves bound, while he himself enjoyed liberty. He started from the goal, he might suppose, like the racer who has got rid of the weights with which his competitors are still encumbered, and expects to succeed of course. But Providence seems always to unite the existence of peculiar danger, with some circumstance which may put those exposed to the peril upon their guard. The constant suspicion attached to any public person who becomes badly eminent for breach of faith, is to him what the rattle is to the poisonous serpent; and men come at last to calculate, not so much on what their antagonist says, as upon that which he is likely to do; a degree of mistrust which tends to counteract the intrigues of such a faithless character, more than his freedom from the scruples of conscientious men can afford him advantage. The example of Louis XI. raised disgust and suspicion rather than a desire of imitation among other nations in Europe, and the circumstance of his outwitting more than one of his contemporaries, operated to put others on their guard.

FRENCH.

DR. ATKINSON.

1. Translate the following passages ; (whence they are taken) ?

- (a) Ainsi, quand désertant sa bauge solitaire,
 Le sanglier, frappé de mort,
 Est là, tout palpitant, étendu sur la terre,
 Et sous le soleil qui le mord ;
 Lorsque, blanchi de bave et la langue tirée,
 Ne bougeant plus en ses liens,
 Il meurt, et que la trompe a sonné la curée
 A toute la meute des chiens,
 Toute la meute, alors, comme une vague immense,
 Bondit ; alors chaque matin
 Hurle en signe de joie, et prépare d'avance
 Ses larges crocs pour le festin ;
 Et puis vient la cohue, et les abois féroces
 Roulent de vallons en vallons ;
 Chiens courants et limiers, et dogues, et molosses,
 Tout s'élance, et tout crie : Allons !
 Quand le sanglier tombe et roule sur l'arène,
 Allons ! allons ! les chiens sont rois !
 Le cadavre est à nous ; payons-nous notre peine,
 Nos coups de dents et nos abois.
 Allons ! nous n'avons plus de valet qui nous fouaille
 Et qui se pend à notre cou :
 Du sang chaud, de la chair, allons, faisons ripaille,
 Et gorgeons-nous tout notre soûl !
 Et tous, comme ouvriers que l'on met à la tâche,
 Fouillent ces flancs à plein museau,
 Et de l'ongle et des dents travaillent sans relâche,
 Car chacun en veut un morceau ;
 Car il faut au chenil que chacun d'eux revienne
 Avec un os demi-rongé,
 Et que, trouvant au seuil son orgueilleuse chienne,
 Jalouse et le poil allongé,
 Il lui montre sa gueule encor rouge, et qui grogne,
 Son os dans les dents arrêté,
 Et lui crie, en jetant son quartier de charogne :
 " Voici ma part de royauté ! "

- (b) Ce voyageur ailé, comme il est gauche et veule !
 Lui, naguère si beau, qu'il est comique et laid !
 L'un agace son bec avec un brûle-gueule,
 L'autre mime, en boitant, l'infirme qui volait !

(c) Il a su se garder, en ces temps de production hâtive, de livrer à l'impression ces gourmes de jeunesse, ces scories et ces baves de premières fontes.

(d) C'est la différence qui existe entre un dessin de pensionnat improvisé à l'estompe et un rude écorché à la plume de M.-Ange.

(e) 'Vous dotez le ciel de l'art d'on ne sait quel rayon macabre, vous créez un frisson nouveau.' (Of whom and by whom was this said?).

(f) Aujourd'hui, c'est un jour, et demain, c'est toujours.

(g) L'algue et les goëmons lui font un manteau vert.

2. What is the thought in each of the following poems:—Mme. de Girardin's *le Chardon*, V. Hugo's *la Vache*, T. Gautier's *l'Horloge*.

3. Write notices on Arsène Houssaye, on Nicolas Martin, on Auguste Lacausade, and on Henri Blaze.

4. Quote some single stanza from each of the following:—V. Hugo, L. de Lisle, A. Barbier, V. de Laprade.

5. Give as *fully* as you can the substance of Baudelaire's critique on V. Hugo.

6. Write an article on French lyric poetry of the nineteenth century.

GERMAN LITERATURE.

MR. BARLOW.

1. Give an account of Körner's poem—"Auf dem Schlachtfelde von Aspern." Date and circumstances of the battle?

2. What is the subject of his poem named "Durch!" What of "Was uns bleibt?"

3. In what way did Wilhelm Meister become acquainted with Melina and his wife?

4. In what connection does the song commencing—"Kennst du das Land, wo die Citronen blühen?" come in in the story? The opening lines of a poem of Byron's are supposed to have been suggested by this song. What poem?

5. Wilhelm Meister made his first acquaintance with the plays of Shakspeare under somewhat peculiar circumstances?

6. Write a description of the character of (a) Lothario, (b) Natalie.

7. There are several blunders in spelling and grammar in the following passage. Correct them:—

"Unter allen Thüren war, wie man leicht errachten kann, die Thüre des Speisekammer diejenige, auf die meine Sinne am schärfsten gerichtet war. Wenig anungsvolle Freuder des Lebens glichen der Empfindung, wenn mich meine Mutter mankmal hineinrief, um ihre etwas heraustragen zu helfen, und ich dan einigen gedörnte Pflaumen entweder ihrer Güte oder meiner Lift zu danken hatte."

8. Translate into German:—

"One of the conditions, under which our friend had gone upon the stage, was not acceded to by Serlo without some limitations. Wilhelm had required that Hamlet should be played entire and unmutilated; the other had agreed to this strange stipulation, in so far as it was possible. On this point they had many a contest; for as to what was possible or not possible, and what parts of the piece could be omitted without mutilating it, the two were of very different opinions. Wilhelm was still in

that happy season, when one cannot understand how, in the woman one loves, in the writer one honours, there should be anything defective. The feeling they excite in us is so entire, so accordant with itself, that we cannot help attributing the same perfect harmony to the objects themselves. Serlo again was willing to discriminate, perhaps too willing; his acute understanding could usually discern in any work of art nothing but a more or less imperfect whole. He thought that as pieces usually stood, there was little reason to be chary about meddling with them; that of course Shakspeare, and particularly Hamlet, would need to suffer much curtailment."

9. Translate the following passages :—

(a) "Ich war ein gequälter Mann, begann Knips, wer anders gelebt hat, weiss nicht, wie schwer es ist, immer in seiner Wissenschaft zu dienen und fremden Füßen nachzutreten. Sie haben nie für Andere, die weniger wissen als Sie, gearbeitet. Sie verstehen nicht, welches Gefühl es giebt, wenn die Anderen hochfahrend benutzen ohne Anerkennung und ohne Dank, was man ihnen von seinem Wissen gegeben hat. Ich bin nicht unempfindlich gegen Freundlichkeit. Der Herr Professor war der erste, welcher bei dem ersten Autor, den Derselbe bei uns herausgab, in den letzten Zeilen der Einleitung meinem Namen genannt hat, weil ich Denenselben bei der Arbeit gedient. Und doch habe ich weniger für Sie gethan als für jeden andern meiner alten Gönner. Das Exemplar, welches Sie mir damals geschenkt, habe ich unter meine Bücher auf den Ehrenplatz gestellt. So oft ich müde wurde von der Nachtarbeit, habe ich diese Zeilen gelesen. Dergleichen Freundlichkeit habe ich selten erfahren. Aber ich habe die Qual gefühlt mehr zu wissen als ich bedeute, und mir hat die Gelegenheit gefehlt mich herauszuarbeiten aus meiner Enge."

(b) "Du schläfst so sanft! Die stillen Züge hauchen
Noch Deines Lebens schöne Träume wieder;
Der Schlummer nur senkt seine Flügel nieder,
Und heil'ger Friede schliesst die klaren Augen.
So schlummre fort, bis Deines Volkes Brüder,
Wenn Flammenzeichen von den Bergen rauchen,
Mit Gott versöhnt die rost'gen Schwerter brauchen,
Das Leben opfernd für die höchsten Güter.
Tief führt der Herr durch Nacht und durch Verderben;
So sollen wir im Kampf das Heil erwerben,
Dass unsre Enkel freie Männer sterben.
Kommt dann der Tag der Freiheit und der Rache:
Dann ruft Dein Volk; dann, Deutsche Frau, erwache,
Ein guter Engel für die gute Sache."

ENGLISH LITERATURE.

PROFESSOR DOWDEN.

1 (a). How does Bacon contrast the spirit of the New Testament with that of the Old?

(b). A desperate saying of Cosmus, Duke of Florence, against perfidious friends?

(c). Why should a lie be such an odious charge? Montaigne answereth prettily?

(d). That school, which is most accused of atheism, doth most demonstrate religion.

(e). Bacon's advice respecting the way to form difficult habits which oppose our nature.

(f). Set down some of Bacon's saying in favour of innovations.

2 (a). What are the marks which laws of reason may be known by (Hooker)?

(b). Laws may be imposed upon men by any of four different powers or authorities; of these four kinds of laws each kind contains laws positive and laws natural. Give examples. What determines whether positive laws be permanent or mutable?

3. Briefly exhibit your acquaintance with the Soliloquies of Hamlet; and state the significance of each soliloquy in the interpretation of Hamlet's character.

4. Annotate the following passages:—

(a). "I say yon grey is not the morning's eye;
'Tis but the pale reflex of *Cynthia's* brow."

(b). "Hunting thee hence with *hunts-up* to the day."

(c). "This precious book of love, this unbound lover,
To beautify him only lacks a cover."

(d). "*First citizen.* Clubs! bills and partizans."

(e). "Ere he can spread his sweet leaves to the air,
Or dedicate his beauty to the sun."

(f). "Nay, I can *gleek* upon occasion."

(g). "I am not *Barbason*."

(h). "Such black and *grained* spots."

(i). "Nay then, let the devl wear black for I'll have a suit of
sables."

(j). "To divide him inventorially would dizzy the arithmetic of
memory, and yet but *yaw* neither, in respect of his quick
sail."

(k). "Chill not let go zir, without vurther 'casion."
What dialect is this?

(l). "Needless *diffidences*, banishment of friends, *dissipation of
cohorts*."

(m). Macbeth, Act iii. sc. 3. Enter *three* murderers.

(n). *Donalbain.* "The near in blood,
The nearer bloody."

(o). *Seyton.* "The queen, my lord, is dead.
Macbeth. She should have died hereafter;
There would have been a time for such a word."

MR. PALMER.

1. Sketch the history of the English metrical romance.
2. Give some account of the Chronicle of Robert of Gloucester, of Lawrence Minot, and of the Vision of Piers Ploughman.
3. The metres regularly in use before Chaucer may be reduced to four? State what compositions of Chaucer are written in any of these metres.

Whence did Chaucer derive his principal metre (the Heroic)?

4. The statement that Chaucer introduced syllabic as well as accental regularity into our versification has been disputed: on what grounds?
 5. Show that Chaucer's supposed obligations to Italian literature for the originals of several of his Tales rest on doubtful grounds?
 6. Chaucer is the author of three separate works in prose?
 7. Give the title and date of what is supposed to have been the earliest work printed in England?
 8. Name the authors of the following works: *Basilicon Doron*, the *Duchess of Malfy*, *Nymphidia*, *Toxophilus*.
 9. Ben Jonson belongs to a different school of dramatists from Shakespeare?
 10. For what excellence does Shakespeare seem to have been most admired by his contemporaries?
 11. Arrange the plays of Shakespeare as nearly as you can in the order of their composition.
- The play called by Meres "*Love's labours Won*" has been identified with three of the existing plays by separate critics?
12. What were the first and second plays written in blank verse in England?
 13. What services to English literature were rendered by the Earl of Surrey?
 14. Draw out a scheme representing the Teutonic family of languages.
 15. Analyse the terminations indicating degrees of comparison in English with relation to cognate forms in other languages.
Analyse the words *former*, *rather*, *best*, *farther*, *further*.
 16. Write an historical account of the possessive pronoun *its*.
 17. Distinguish between a root and a stem; and analyse the word *hated*.
 18. What do you mean by strong and weak verbs?

SENIOR FRESHMEN.

Mathematics.

A.

LIMITED COURSE.

MR. WILLIAMSON.

1. Being given a pair of circles; if the inverse pair be taken with respect to any point, prove that the ratio of the square of a common tangent to the product of the radii is the same for each pair of circles.

2. Show that the equation

$$6x^2 + xy - y^2 - x + 7y - 12 = 0$$

represents a pair of right lines, and determine their equations.

3. Prove that the perpendiculars drawn from the angles of a spherical triangle to the opposite sides pass through a common point.

4. Find the least pressure, applied parallel to the plane, which will sustain a body of 100 lb. weight upon a plane whose gradient is 7 in 25; the coefficient of friction being $\frac{1}{4}$.

Find also the least force, parallel to plane, which would cause the body to move up the plane.

5. Find the position of equilibrium of a beam in a hemispherical bowl, when part of the beam projects beyond the rim of the bowl.

6. A roof is composed of beams forming isosceles triangles; find an expression for the horizontal thrust on the side walls.

DR. TRAILL.

7. A certain weight can be sustained on a smooth inclined plane, either by a horizontal force P , or by a force Q parallel to the plane; find the weight.

8. Find the best angle at which to apply a force so as to pull a body up a rough inclined plane. Inclination = a , coefficient of friction = μ .

9. Find the length of the perpendicular from the point (a, β) on the line

$$a(x - a) + b(y - b) = 0.$$

10. Find the equations of the three perpendiculars of a triangle whose vertices are $x'y'$, $x''y''$, $x'''y'''$; show that they intersect in a point, and find the co-ordinates of this point.

11. Given two sides of a spherical triangle and the included angle, determine the remaining side and angles.

12. If the distances of two points from the angles of a quadrantal triangle be $(\alpha\beta\gamma)$, $(\alpha'\beta'\gamma')$, and θ the distance between the points, prove

$$\cos \theta = \cos \alpha \cdot \cos \alpha' + \cos \beta \cos \beta' + \cos \gamma \cos \gamma'.$$

MR. PANTON.

13. Find the equations of the two tangents from the origin to the circle

$$x^2 + y^2 - 2ax - 2by + a^2 = 0.$$

14. Prove that the area of the triangle contained by the lines

$$y = x \tan \alpha, \quad y = x \tan \beta, \quad y = x \tan \gamma + c$$

is

$$\frac{c^2}{2} \frac{\sin(\alpha - \beta) \cos^2 \gamma}{\sin(\alpha - \gamma) \sin(\beta - \gamma)}.$$

15. If two circles touch externally, find in terms of their radii an expression for the cosine of the angle between their common tangents.

16. Prove the formula in a spherical triangle

$$\tan^2 \frac{1}{2} A = \frac{\sin(s-b) \sin(s-c)}{\sin s \sin(s-a)}.$$

17. Assuming that the diagonal of the parallelogram of forces represents the resultant in direction, prove that it represents it in magnitude also.

18. A heavy uniform beam $ABCD$, whose length is 15 ft. and weight 20 lbs., is loaded at its extremities A, D with weights of 1 lb. and 4 lbs., respectively, and at its points of trisection B, C with weights of 2 lbs. and 3 lbs. Find the distance of the centre of gravity from the centre of the beam.

B.

MR. WILLIAMSON.

1. If Σ represent the superficial area of any closed curve on a sphere, and s the perimeter of its polar curve: prove that $\Sigma + rs$ is equal to the hemispherical surface.

2. Determine the values of the integrals,

$$\int \frac{dx}{x^2 + x - 12} \quad \text{and} \quad \int \cos^3 x \sqrt{\sin x} dx.$$

3. Find the area of a loop of the curve

$$r = a \cos n\theta.$$

4. A ladder rests on the ground and against a vertical wall, and is kept in equilibrium by a cord connecting the base of the wall with a rung of the ladder. Find the tension of the cord, the ground and the wall being supposed perfectly smooth.

5. A body weighing 60 tons is placed on a plane of gradient 1 in 12, and acted on by two chains (each capable of bearing a strain of 1 ton) in the direction of the plane. If the chains break when the body is just on the point of moving, find the coefficient of friction between the body and the plane.

DR. TRAILL.

6. Prove that in the parabola the focal chord of curvature, at any point, is equal to the parameter of the diameter passing through the point.

7. Find the values of

$$\int \frac{dx}{1 + 2 \cos x} \quad \text{and} \quad \int \frac{dx}{2 + \cos x}.$$

8. If $u = y\sqrt{a^2 - x^2} + x\sqrt{a^2 - y^2}$, find the value of

$$\frac{du}{dx} \cdot \frac{du}{dy} + \sqrt{a^2 - x^2} \sqrt{a^2 - y^2} \left(\frac{d^2u}{dx dy} \right)^2.$$

9. A heavy particle rests on a rough inclined plane; find the direction in which a force, exactly equal to the weight of the particle, should be applied so as to preserve equilibrium.

10. Find the greatest inclination at which a ladder can be placed against a smooth wall if the coefficient of friction with the ground be $\frac{1}{2}$.

If the wall be equally rough with the ground, find the greatest inclination in such case.

MR. PANTON.

11. A uniform beam rests with one end upon a given inclined plane, the other end being suspended by a string from a fixed point above the plane; determine the position of equilibrium, the tension of the string, and the pressure on the plane.

12. Find the asymptotes of the curve

$$y^3 - 2xy^2 - x^2y + 2x^3 + 2y^2 - 4xy + 1 = 0.$$

13. Find the integrals

$$\int \frac{dx}{x(1+x+x^2+x^3)}, \quad \int \frac{dx}{a+b \sin x}.$$

14. Find the equation of the pair of tangents from the origin to the conic

$$ax^2 + 2hxy + by^2 + 2gx + 2fy + c = 0,$$

and determine in what cases they can be coincident.

15. Express the radius of the circle circumscribing a triangle inscribed in a parabola in terms of the principal parameter and the focal chords parallel to the sides of the triangle.

C.

MR. WILLIAMSON.

1. Find the complete expression for the integral

$$\int \frac{dx}{x^n - 1}.$$

2. Find the area of the Limaçon

$$r = a \cos \theta + b;$$

distinguishing between the cases, as $a > b$, or $a < b$.

3. In a curve of the third degree, prove that every line drawn from a point of inflexion is cut harmonically by the curve and the polar of the point of inflexion.

4. A uniform ladder, 35 feet in length, is placed against a wall at an elevation of 30° ; the coefficient of friction at each end being $\frac{1}{2}$. Find how far a man, whose weight is five times that of the ladder, can ascend it before the ladder begins to slip.

5. Three weights, W_1, W_2, W_3 , are placed at points, A, B, C , in the circumference of a circular plate, which rests on a prop placed beneath its centre; prove that for equilibrium

$$W_1 : W_2 : W_3 = \sin 2A : \sin 2B : \sin 2C.$$

6. If the co-ordinates of a point on a curve be given by the equations

$$x = c \sin 2\theta (1 + \cos 2\theta), \quad y = c \cos 2\theta (1 - \cos 2\theta),$$

find the radius of curvature at the point.

DR. TRAILL.

7. Prove that the angle between the pair of tangents drawn from the point $x'y'$, to the ellipse whose semiaxes are a and b , is given by the equation

$$\tan \phi = \frac{2ab \sqrt{\frac{x'^2}{a^2} + \frac{y'^2}{b^2} - 1}}{x'^2 + y'^2 - a^2 - b^2}.$$

8. Show from the equation of the circle circumscribing the triangle formed by three tangents to a parabola that it passes through the focus.

9. A right cone rests on the vertex of a paraboloid of revolution, prove that the equilibrium will be neutral when the altitude of the cone is equal to twice the *latus rectum* of the parabola.

10. Prove that the maximum value of $\cos \theta \cdot \cos \phi \cdot \cos \psi$, when $\theta + \phi + \psi = \pi$, is 2^{-3} ; and find the maximum and minimum values of

$$(\sin x)^{\sin x}.$$

11. Circles are described on successive double ordinates of a parabola as diameters, show that they all touch an equal parabola.

12. Find the values of

$$\int x^3 \cdot \cos x \cdot dx,$$

$$\int e^{ax} \cdot \cos^2 x \cdot dx.$$

MR. PANTON.

13. Find general expressions for the co-ordinates of the foot of the perpendicular from origin on tangent, and for the tangent of the angle included between the perpendicular and radius vector to the point (x, y) on the curve $F(x, y) = 0$.

14. If ρ is the radius of curvature at the point (x, y) on any curve, prove

$$\rho^4 \left\{ \left(\frac{d^2x}{ds^2} \right)^2 + \left(\frac{d^2y}{ds^2} \right)^2 \right\} = 1 + \left(\frac{d\rho}{ds} \right)^2.$$

15. Find the definite integral

$$\int_0^{\frac{1}{2}\pi} \sin^n x \, dx,$$

when n is even; and hence write down the expansion of

$$\int_0^{\frac{1}{2}\pi} \frac{d\theta}{\sqrt{1 - k^2 \sin^2 \theta}}$$

to five terms.

16. Find the condition that the normals at the three points α, β, γ on an ellipse should meet in a point.

17. If ρ, ρ' are the radii vectors from a focus to the points α, β on an ellipse, and δ the radius vector to the point of intersection of the tangents at these points, prove

$$\rho\rho' = \delta^2 \cos^2 (\alpha - \beta).$$

18. A heavy uniform beam is placed with one end on a rough horizontal plane, and rests so as to be a tangent to a rough plane curve, the curve and the beam being situated in the same vertical plane. If the friction is the same for the curve and the plane, show that, in order that the beam may rest in every position in equilibrium bordering on motion, the curve must be such that

$$2a \frac{dy^2}{dx^2} = y \sin 2\epsilon \frac{ds^2}{dx^2},$$

where ϵ is the angle of friction, and a half the length of the beam.

Classics.

HOMER.

MR. ABBOTT.

Translate the following passages:—

1. *Beginning*, Εἰ γὰρ νῦν παρὰ νηυσὶ λεγόμεθα πάντες ἄριστοι, κ.τ.λ.
Ending, Πρόσω λεμένιοι, μετὰ προμάχων δαριστύν.

Iliad, N. 275-291.

2. *Beginning*, Τὸν βάλε νείαιραν κατὰ γαστέρα· λῦσε δὲ γυνία, κ. τ. λ.
Ending, Ἄλλ' ἱβαλ', ἐνθ' ἄρα τε φρίνεις ἔρχεται ἀμφ' ἀδινδὸν κῆρ.
Iliad, Π'. 465-481.
3. *Beginning*, Ἐν δὲ τίθει σταφυλῷσι μέγα βρίθουσαν ἄλωήν, κ. τ. λ.
Ending, Μολπῇ τ' ἰὺ γμῶ τε ποσὶ σκαίροντες ἔποντο.
Ibid., Σ'. 561-572.
4. *Beginning*, Πολλὰ δ' ἀναντα, κάταντα, πάραντά τε, δόχμιά τ' ἤλ-
θον, κ. τ. λ.
Ending, Φράσσατο Πατρόκλη μέγα ἥριον, ἡδὲ οἱ αὐτῶ.
Ibid., Ψ. 116-128.
5. *Beginning*, κήρυξ δ' ἐγγύθεν ἦλθεν ἄγων ἱρήρον δαιδόν, κ. τ. λ.
Ending, νεῖκος Ὀδυσσῆος καὶ Πηλεΐδω Ἀχιλλῆος.
Odyssey, Θ. 62-74.

1. What view did Herodotus take of the Trojan legend?
2. Characterise the state of mind of the mythopoeic age. The change in the meaning of the word *μῦθος* is significant?
3. What analogy does Grote point out between the Greeks and the Germans as regards mythology?
4. What are the *external* arguments against Wolf's theory?
5. What reasons are given by Grote for the date he assigns to the first writing of the Homeric poems?
6. How is it known that the digamma existed in these poems originally? Mention some words known to have had the digamma.
7. Explain the following Homeric forms:—the termination *φι*, the infinitive in *μεναι*, the genitive in *οιο*. Parse *βλεῖτε* (first passage, line 13).

MR. MAHAFFY.

Translate the following passages:—

1. *Beginning*, O vere Phrygiæ, neque enim Phryges, ite per alta....
Ending, Constitit, ante Jovem supplex per vota precatus.
VIRGIL, Æneid, lib. ix. 617-624.
2. *Beginning*, Ac velut ille canum morsu de montibus altis.....
Ending, Missilibus longe et vasto clamore lacessunt.
Ibid., lib. x. 707-718.
3. *Beginning*, At vero Rutulis impar ea pugna videri.....
Ending, Vix hostem, alterni si congrediamur, habemus.
Ibid., lib. xii. 216-232.
4. *Beginning*, Tibi dextera bello.....
Ending, Huic date, et ostendit signum fatale Minervæ.
OWID, Metamm., xiii. 361-381.
5. *Beginning*, Ab Iove Callirhoë natis infantibus annos,.....
Ending, Pondera despicitur, nec quo prius ordine regnat'.
Ibid., ix. 414-438.

1. Criticise Merivale's tripartite division of the old world as regards the Eastern Division.

2. 'Gaul, Spain, and Africa produced no original minds' under the Empire. Is this true?

3. What advantages and disadvantages resulted from Roman rule when extended to provinces and allies?

4. What reasons have been assigned for the advice appended by Augustus to his Breviarium? What evidence have we of the accuracy of this table?

5. Sketch the history of Corinth subsequent to 146 B. C.

6. Write a note on the following :

Quid laudem risus libertatemque Menandri,
Quam Romanus honos et Graia licentia miscent ?

7. Explain the following :

(a). Quam forti pectore et armis.

(b). Quo numine laeso

Quidve dolens, regina deum tot volvere casus
Insignem pietate virum
Impulerit.

(c). Quam mihi quum dederis, cumulatam morte remittam.

8. Write a note on the Roman amphitheatres, and the moral effects of the performances in them.

MR. POOLE.

To be translated into Greek prose :

In the midst of his apparent prosperity, Alaric was conscious, perhaps of some secret weakness, some internal defect; or perhaps, the moderation which he displayed was intended only to deceive and disarm the easy credulity of the ministers of Honorius. The king of the Goths repeatedly declared, that it was his desire to be considered as the friend of peace and of the Romans. Three senators, at his earnest request, were sent ambassadors to the court of Ravenna, to solicit the exchange of hostages, and the conclusion of the treaty; and the proposals, which he more clearly expressed during the course of the negotiations, could only inspire a doubt of his sincerity, as they might seem inadequate to the state of his fortune. The barbarian still aspired to the rank of Master-General of the armies of the West; he stipulated an annual subsidy of corn and money; and he chose the provinces of Dalmatia, Noricum, and Venetia, for the seat of his new kingdom, which would have commanded the important communication between Italy and the Danube.—GIBBON.

To be translated into Latin prose :

I hope I am far from that vain confidence which almost always fails in trial. I know my weakness in all respects—as much, at least, as any

enemy I have; and I attempt to take security against it. The only method which has ever been found effectual to preserve any man against the corruption of nature and example, is a habit of life and communication of counsels with the most virtuous and public-spirited men of the age you live in. Such a society cannot be kept without advantage, or deserted without shame. For this rule of conduct I may be called, in reproach, a party man; but I am little affected with such aspersions, and I shall never blush for my political company. All reverence to honour—all idea of what it is—will be lost out of the world before it can be imputed as a fault to any man, that he has been closely connected with those incomparable persons, living and dead, with whom I have constantly thought and acted; among whom some have extended your fame and empire in arms, and all have fought the battle of your liberties in fields not less glorious.—BURKE.

Translate *one* of the following passages as directed:—

GREEK VERSE.

There we are all undone.
 It is not possible, it cannot be,
 The king should keep his word in loving us;
 He will suspect us still, and find a time
 To punish this offence in other faults:
 Suspicion shall be all stuck full of eyes:
 For treason is but trusted like the fox;
 Who, ne'er so tame, so cherish'd, and lock'd up,
 Will have a wild trick of his ancestors.
 Look how we can, or sad, or merrily,
 Interpretation will misquote our looks;
 And we shall feel like oxen at a stall,
 The better cherish'd, still the nearer death.
 My nephew's trespass may be well forgot,
 A hair-brain'd Hotspur, govern'd by a spleen;
 All his offences live upon my head,
 And on his father's

LATIN VERSE.

Companion of my tender age,
 Serenely gay, and sweetly sage,
 How blithsome were we wont to rove
 By verdant hill, or shady grove,
 Where fervent bees with humming voice
 Around the honied oak rejoice,
 And aged elms with awful bend
 In long cathedral walks extend!
 Lulled by the lapse of gliding floods,
 Cheered by the warbling of the woods,
 How blest my days, my thoughts how free,
 In sweet society with thee!
 Then all was joyous, all was young,
 And years unheeded rolled along:

But now the pleasing dream is o'er,
 Those scenes must charm me now no more.
 Lost to the fields, and torn from you,—
 Farewell! a long, a last adieu!
 The wrangling courts, and stubborn law,
 To smoke, and crowds, and cities draw:
 There selfish faction rules the day,
 And pride and avarice throng the way.

Logics.

MILL'S LOGIC.

DR. STUBBS.

1. What five-fold division is an exhaustive classification of what can be asserted or denied in every proposition?
2. How does Whately endeavour to meet the objection to syllogism that it involves a *petitio principii*? And where does he fail to meet the difficulty according to Mill?
3. How does Mill show that the function of the syllogism is a process of interpretation and not of inference; whether the premises are given by authority, or derived from observation.
4. What are the three modes of explaining the laws of causation, or of resolving them into other laws?
5. How does the method of Residues differ from the ordinary practice of the method of Differences?
6. What examples does Sir John Herschel give of the method of Residues?
7. What metaphysical doctrine led to the opinion that Volition is the sole *efficient* cause of all phenomena? How does Mill criticise this theory?
8. Hobbes' theory of Predication is virtually identical with the more common one? Of what logical error is the latter an example?

DR. TARLETON.

1. What accounts of the nature of the Ego are given, according to Hamilton, by Hume and Kant?
 How does Hamilton endeavour to refute them?
 His argument against Kant is fallacious and dependent on the ambiguity of the expressions made use of by Hamilton?
2. The facts of consciousness are of two kinds, according to Hamilton?
 How does Hamilton show that Brown was inconsistent in his mode of establishing the existence of the external world?

The refutation of Brown contains a clear statement of the exact nature of a fact of consciousness of the second kind ?

From the inconsistencies into which Brown fell with respect to Personal Identity and Mental Individuality, Kant, as his opinions are described by Hamilton, is free ?

3. How are Philosophers classified by Hamilton in reference to their different theories of Perception ?

4. How does Hamilton show that a perfectly accurate psychological observation is impossible ?

He mentions some mental phenomena with respect to which the difficulties of observation are particularly great ?

5. What results does Jouffroy arrive at in reference to the state of the mind in sleep, and on what observations are they based ?

What facts are mentioned by Hamilton in support of the theory that the mind is conscious during sleep.

How does Hamilton and how does Kant account for the fact that dreams are frequently forgotten ?

6. How does Hamilton state the question with respect to latent mental modifications of the third class, and by what arguments does he endeavour to establish their existence ?

MANSSEL AND LOCKE.

DR. SHAW.

1. How does Locke answer the question, "What guarantee have we of the reality of our knowledge ?"

2. How much does he grant in favour of identical propositions, and of the Principles of Identity and Contradiction ?

3. The imaginary single-sense monster of Condillac would not, says Mansel, be in any sense a conscious being ; why not ?

4. Apply to ethical theory Mansel's doctrine of the duplicity of the speculative faculty.

5. What differences does Mansel acknowledge between Conception, Judgment, and Reasoning, regarded as *entia rationis* ?

6. Give the steps of the process by which Mansel establishes the laws of Conception, and identifies them with the commonly-recognised logical forms of the Concept proper.

7. How does Mill show (a) that every synthetic judgment exhibits the same fundamental forms as Concepts (*viz.*, Unity, Plurality, and Totality) ; and (β) that in judging, as well as in conceiving, the three Laws of Thought are operative ?

8. Reproduce Mansel's exposition of the Principle of Causality, his account of its apparent necessity, and his criticisms on the doctrines held by Hume, Brown, and Hamilton on the same subject.

9. What are the points of analogy and of difference, noticed by Mansel, between geometrical judgments and the numerical intuitions, 3, 4, &c.

10. How does Locke argue against those who contend that matter is the first, eternal Being ?

English Literature and Composition.

MR. BARLOW.

A.

1. Give as many quotations as you can from the following poems:—

- (a). Gray's Hymn to Adversity.
- (b). Wolfe's Burial of Sir John Moore.
- (c). Wordsworth's Yarrow Unvisited.
- (d). Milton's Sonnet to the Lady Margaret Ley.

2. Write notes on the following lines:—

- (a). "Then felt I like some watcher of the skies
When a new planet swims into his ken."
- (b). "Time will run
On smoother, till Favonius re-inspire
The frozen earth, and clothe in fresh attire
The lily and rose, that neither sow'd nor spun."
- (c). "A careless shoe-string, in whose tie
I see a wild civility."
- (d). "Drumossie moor—Drumossie day—
A waefu' day it was to me!
For there I lost my father dear,
My father dear and brethren three."
- (e). "King Pandion, he is dead,
All thy friends are lapp'd in lead:
All thy fellow-birds do sing
Careless of thy sorrowing."
- (f). "Bid me despair, and I'll despair,
Under that cypress tree:
Or bid me die, and I will dare
E'en Death, to die for thee."
- (g). "Curst be the heart that thought the thought,
And curst the hand that fired the shot,
When in my arms burd Helen dropt,
And died to succour me!
- (h). "Some time let gorgeous Tragedy
In scepter'd pall com sweeping by,
Presenting Thebs or Pelops line
Or the tale of Troy divine,
Or what (though rare) of later age
Ennobled hath the buskind stage."
- (i). "I saw their starved lips in the gloam
With horrid warning gap'd wide,
And I awoke and found me here
On the cold hill's side."

(j).

"Thou

For whose path the Atlantic's level powers
 Cleave themselves into chasms, while far below
 The sea-blooms and the oozy woods which wear
 The sapless foliage of the ocean, know
 Thy voice, and suddenly grow gray with fear
 And tremble and despoil themselves : O hear !"

3. Mr. Palgrave describes the Elegy on Thyrsa as "a masterly example of Byron's command of strong thought and close reasoning in verse." Write a critical note on this statement.

4. Give the substance of Mr. Ruskin's remarks on the following subjects:—

- (a). Historical Painting.
- (b). Dogs as painted by the Venetians and others.
- (c). Decoration of Railroad Stations.

B.

1. Date of death of William Cowper ?
2. Of Thomas Gray ?
3. Of Percy Bysshe Shelley ?
4. "Last came and last did go
 The pilot of the Galilean lake."

Who was this pilot ?

5. What are the two next lines in the poem ?
6. "Tax not the royal Saint with vain expense,
 With ill-match'd aims the Architect who plann'd
 (Albeit labouring for a scanty band
 Of white-robed Scholars only) this immense
 And glorious work of fine intelligence !"

Who was the royal Saint ?

7. What was this glorious work ?
8. "Shakspeare," says Wordsworth, "*could* not have written an Epic"—why ?
9. In which of Shakspeare's plays does the madrigal commencing, "Take, O take those lips away," occur ?
10. "And every shepherd tells his tale
 Under the hawthorn in the dale."

Meaning of "tells his tale" ?

11. Who wrote "Black-eyed Susan" ?
12. Who wrote "Sally in our Alley" ?
13. Who wrote the poem commencing—
 "Shall I wasting in despair,
 Die because a woman's fair ?"
14. What does Burns mean by *thrave*, *foggage*, *cranreuch* ?

15. Explain the lines—

“And the repeated air
Of sad Electra’s poet had the power
To save the Athenian walls from ruin bare.”

16. “Artists, considered as searchers after truth, are to be divided into three great classes: a right, a left, and a centre”?

17. Mr. Ruskin notices a marked exception to the general rule innocent things are bright in colour, and attempts an explanation?

18. What is his definition of “great art”?

19. Meaning of Vulgarly in Art?

20. Date and place of the birth of Joseph Turner?

21. “Pre-Raphaelitism has but one principle”?

22. Mr. Ruskin never looks up to the Col de Balme from Chamonix without a violent feeling of provocation. Why?

23. What objection does he make to the east front of Salisbury Cathedral?

24. He suggests an improvement in the external architecture of King’s College Chapel at Cambridge?

25. “In one point of view Gothic is not only the best, but the *only rational* architecture”?

26. What is the only essential distinction between decorative and other art?

27. Mr. Ruskin asserts that “there is not a meaner occupation for the human mind than the imitation of the stains and striæ of marble and wood.” What is his reason?

28. Common sense and courtesy forbid the *repetition* of heraldic decorations in any building?

29. It has often been said that a building, in order to show its magnitude, must be seen all at once—Mr. Ruskin corrects this assertion?

30. “Of all true painters the narrowest, feeblest, and most superficial, for those reasons the most popular.” Who is here spoken of?

ENGLISH LITERATURE.

PROFESSOR DOWDEN.

1. Show that Spenser affected an archaic manner

(a). In grammar.

(b). In vocabulary.

2. In what degree and manner, in your opinion, was Spenser influenced respectively by Italian poetry, Greek philosophy, the Hebrew Scriptures.

Give examples.

3. Reproduce the description of Fidessa, Speranza, and Charissa.

3. Ariel's speech,

" I come
To answer thy best bidding, be't to fly," &c.,

would seem to have been imitated by a contemporary poet ?

4. A person who does not appear in the play is spoken of as present on the Island ?

5. Prospero promises to release Ariel—when ? Why not sooner ?

6. What does Plutarch call the apparition which was seen by Brutus at Philippi ?

7. A contemporary reference makes it probable that Julius Cæsar was written as early as 1601 ?

8. Ben Jonson ridiculed a line which probably stood in Julius Cæsar otherwise than we find it in our texts ?

9. Brutus advises against admitting Cicero to the conspiracy—why ?

10. After the death of Cæsar how do Brutus and Cassius respectively meet Antony ?

11. " All were his earthly even both blunt and bad,
And through great age had lost their kindly sight,
Yet wondrous quick and persant was his spright
As eagle's eye that can behold the sunne."

Of whom is this said ?

12. " For as he forward moov'd his footing old,
So backward still was turned his wrinçled face."

Of whom is this said ?

13. Explain the line

" The tree of life, the crime of our first father's fall."

14. To augment and intensify an impression, Spenser begins four different lines in the same stanza with the same words.

15. What is Orgoglio's parentage ?

16. Write a metrical analysis of the line,

" In prisoun ? certes, nay, but in paradys."

17. " A dronke man not wel he hath an hous,
But he not which the righte wey is thider."

Where did Chaucer find this ?

18. " And evere he rood the hyndreste of the route."

Which pilgrim is this ?

19. Palamon pleads with Arcite that he has a right of possession in Emely because he has seen her first. How does Arcite reply ?

20. " And as a lyoun he his lokyng caste.
Of fyve and twenty yeer his age I caste."

Who is this ?

21. " The Cahiers of 1789." What were these ?

22. There was a petition " presented to Parliament in 1772, signed by 200 clergymen and about 40 members of the professions of Physic and Law." With what object ?

23. "The atrocious spectacle of the sixth of October, 1792." What was this?

24. Subject of Burke's "Letter to Sir Hercules Langrishe (1792)."?

25. Who is the author of the sermon entitled "The Wisdom and Goodness of God in having made both Rich and Poor?"

COMPOSITION.

MR. PALMER.

1. Influence of the French Revolution on Literature.
2. The Romantic treatment of classical matter in English poetry.
3. Shakspeare's conception of the Roman character.
4. A comparison of the supernatural world of "The Tempest" with the fairy world of "A Midsummer Night's Dream."

[Choose one subject.]

Modern Languages.

FRENCH.

MR. BARLOW.

Translate the following passages :

I.

Cent ans ou environ après le déluge, Dieu frappa le genre humain d'un autre fléau par la division des langues. Dans la dispersion qui se devait faire de la famille de Noé par toute la terre habitable, c'était encore un lien de la société, que la langue qu'avaient parlée les premiers hommes, et qu'Adam avait apprise à ses enfants demeurât commune. Mais ce reste de l'ancienne concorde périt à la tour de Babel : soit que les enfants d'Adam, toujours incrédules, n'eussent pas donné assez de croyance à la promesse de Dieu, qui les avait assurés qu'on ne verrait plus de déluge, et qu'ils se soient préparé un refuge contre un semblable accident dans la solidité et dans la hauteur de ce superbe édifice, ou qu'ils n'aient eu pour objet que de rendre leur nom immortel par ce grand ouvrage, avant que de se séparer, ainsi qu'il est remarqué dans la Genèse, Dieu ne leur permit pas de le porter, comme ils l'espéraient, jusqu'aux nues; ni de menacer pour ainsi dire le ciel par l'élévation de ce hardi bâtiment; et il mit la confusion parmi eux, en leur faisant oublier leur premier langage. Là donc ils commencèrent à se diviser en langues et en nations. Le nom de Babel qui, signifie confusion, demeura à la tour, en témoignage de ce désordre, et pour être un monument éternel au genre humain que l'orgueil est la source de la division et du trouble parmi les hommes.

II.

Vois-tu ce malheureux, qu'un tyran de Sicile
 Appelle à son festin ! Pâle et tout effrayé
 De cette menaçante et sinistre amitié,
 Il effleure en tremblant de ses lèvres livides
 Ces breuvages suspects et ces mets homicides ;
 Vers les lambris dorés lève un œil éperdu
 Et croit voir sur son front le glaive suspendu.
 Telle est la défiance au banquet de la vie.
 Que dis-je ? son poison en corrompt l'ambrosie ;
 Elle-même contre elle aiguise le poignard,
 Donne aux ombres un corps, un projet au hasard,
 Charge un mot innocent d'un crime imaginaire,
 Et s'effraie à plaisir de sa propre chimère :
 Ainsi, dans leurs forêts, les crédules humains
 Craignoient ces dieux affreux qu'avoient forgés leurs mains.
 Quel besoin plus pressant nous donna la nature,
 Que de communiquer les chagrins qu'on endure,
 De faire partager sa joie et sa douleur,
 Et dans un cœur ami de répandre son cœur ?

 DR. ATKINSON.

Translate into English :—

Je vis hier une chose, chez Mademoiselle, qui me fit plaisir. Madame de Gêvres arrive, belle, charmante et de bonne grâce ; madame d'Arpajon étoit au-dessus de moi ; je pense que la duchesse s'attendoit que je lui dusse offrir ma place ; ma foi, je lui devois une incivilité de l'autre jour, je la lui payai comptant, et ne branlai pas. Mademoiselle étoit au lit ; madame de Gêvres a donc été contrainte de se mettre audessous de l'estrade ; cela est fâcheux. On apporte à boire à Mademoiselle : il faut donner la serviette. Je vois madame de Gêvres qui dégante sa main maigre ; je pousse madame d'Arpajon : elle m'entend, et se dégante ; et, d'une très-bonne grâce, avance un pas, coupe la duchesse, et prend et donne la serviette. La duchesse de Gêvres en a eu toute la honte ; elle étoit montée sur l'estrade, et elle avoit ôté ses gants, et tout cela pour voir donner la serviette de plus près par madame d'Arpajon. Ma fille, je suis méchante, cela m'a réjouie ; c'est bien employé : a-t-on jamais vu accourir pour ôter à madame d'Arpajon, qui est dans la ruelle, un petit honneur qui lui vient tout naturellement ? Madame de Puisieux s'en est épanoui la rate. Mademoiselle n'osoit lever les yeux ; et moi, j'avois une mine qui ne valoit rien. Après cela on m'a dit cent mille biens de vous, et Mademoiselle m'a commandé de vous dire qu'elle étoit fort aise que vous ne fussiez point noyée et que vous fussiez en bonne santé.

-
1. Write what you know of the "Mémoires" in French literature.
 2. Who are the best-known female writers of France ?

3. Four great names represent the poetry of the age of Louis XIV : Give some account of their lives and works.
4. Write a notice on Lafontaine's fables, discussing (a) their source, (b) subjects, and (c) treatment.
5. Write out any single fable of Lafontaine.
6. Give a full analysis of any single letter of Mme. de Sevigné.

Translate accurately the following lines of Lafontaine (Fab. Book VIII.) and explain their meaning :

- (a) Le pauvre Eschyle ainsi sut ses jours avancer.
- (b) Certains compliments de consolation, qui sont surcroît d'affliction.
- (c) Point de chardons pourtant ; il s'en passa pour l'heure.
- (d) Que si ce loup t'atteint, casse-lui la mâchoire.
- (e) Tant c'est chère denrée qu'un protecteur !
- (f) Tu n'as point l'air d'un donneur de breuvage.
- (g) Lui, berger, pour plus de ménage, auroit deux ou trois mâtineaux.
- (h) Toute l'engeance humaine sera bientôt du domaine des déités de là-bas.
- (i) Ce dieu remplit ses fourneaux de deux sortes de carreaux.
- (j) Qu'importe quel animal ? Voilà toujours curée.
- (k) Est-il juste qu'on meure au pied levé ?
- (l) Dans l'an s'entremêlent des jours qu'il faut chômer.
- (m) De quelque nouveau saint (il) charge toujours son prône.
- (n) Il daube, au coucher du roi, son camarade absent.
- (o) Point de courroux, messieurs ; mon lopin me suffit.
- (p) Il s'en informoit donc à ce menu fretin.
- (q) Le fidèle émoucheur vous empoigne un pavé.
- (r) C'est bien là que les gens sont de simples ressorts.

MR. MAHAFFY.

Translate the following passages :—

I.

Es hört sie jeder,
Geboren unter jedem Himmel, dem
Des Lebens Quelle durch den Busen rein
Und ungehindert fliesst. Was sinnst du mir,
O König, schweigend in der tiefen Seele ?
Ist es Verderben, so tödte mich zuerst !
Denn nun empfind' ich, da uns keine Rettung
Mehr übrig bleibt, die grässliche Gefahr,

Worein ich die Geliebten übereilt
 Vorsätzlich stürzte. Weh! ich werde sie
 Gebunden vor mir sehn! Mit welchen Blicken
 Kan ich von meinem Bruder Abschied nehmen,
 Den ich ermorde? Nimmer kann ich ihm
 Mehr in die vielgeliebten Augen schau'n!

II.

Heinrich IV. ward immer fester in dem Entschluss, erst nach gewonnenem Sieg in Deutschland mit Gregor VII. zu handeln. Indem er auseinandersetzte, wie das Geleit zur Himmelfahrt zu senden unmöglich sei, nötigte er jenen zur Vertagung der auf die Pfingstsynode festgesetzten Entscheidung. Die von ihm vorgeschlagene Zusammenkunft zu Fritzlar zerschlug sich, weil Welf rücksichtlich des Geleits nicht sicher zu sein erklärte, die zu Würzburg kam nicht zu Stande, weil Heinrich den Sachsen die verlangten Geiseln verweigerte. Beide Teile gewannen die Überzeugung, dass jeder den Frieden nur unter Bedingungen wolle, die der andre nicht zugestehen könne, dass sie die Entscheidung mit den Waffen suchen müsten. Heinrichs IV. Glück war im Steigen. Dem mit seiner Tochter Agnes verlobten Friedrich von Staufen übertrug er das Herzogtum Schwaben. Zwar ward auf Welfs Betrieb Rudolfs Sohn Berchthold von den Gegnern die Fahne verliehn und jeder Fussbreit Landes Friedrich streitig gemacht, aber der Gegenkönig konnte von dorthier keinen Beistand erwarten.

GERMAN.

PROFESSOR SELSS.

1. Translate into German:

Your father received me in his library, and on my taking leave, showed me a shorter way out of the house, through a narrow passage, over which hung a thick beam. We were still talking as I withdrew, he accompanying me behind, and I turning partly towards him, when he said hastily, "Stoop, stoop!" I did not understand him till I felt my head hit against the beam. He was a man who never missed any occasion of giving instruction; and upon this he said to me, "You are young, and have the world before you; stoop as you go through it, and you will miss many hard thumps." This advice, thus beat into my head, has frequently been of use to me; and I often think of it when I see pride mortified and misfortune brought upon people by their carrying their heads too high.—FRANKLIN.

2. Translate into English:

In dem Augenblicke als Friedrich seiner völligen Niederlage und dem Sturze der preussischen Monarchie entgegensah, kam ihm ein unerwartetes Ereigniss zu Hülfe. Die Kaiserin Elisabeth von Russland starb den 5 Januar, 1762, und ihr Thronfolger Peter besass in eben dem Grade eine Zuneigung zum Könige von Preussen, als ihn jene Herr-

scherin gehasst hatte. Eine der ersten Handlungen Peters war, seinen Günstling Gudowitz ins Hauptquartier nach Breslau zu schicken, und Friedrich seiner Freundschaft zu versichern. Der traulichen Versicherung folgte ein Waffenstillstand, dann ein Friede; und dem Frieden folgte ein Bündniss. Die letzte Stufe war dass der russische General Tschernyschew Befehl erhielt, mit seinen sämmtlichen Truppen die Oesterreicher zu verlassen und zum Könige von Preussen zu stossen, dem er unbedingt gehorchen sollte. Dies war ein Donnerschlag für Maria Theresia, welche nach den letzten Eroberungen den Krieg für so gut als beendet ansah. Der Wechsel war so plötzlich, dass Niemand daran glauben wollte; man hielt das Ganze für ein Gerücht, um den Muth der preussischen Truppen zu beleben. Daher unterliessen es auch die Oesterreicher, die gefährliche Vereinigung der Russen und Preussen zu verhindern. Die Schweden machten sofort ebenfalls Frieden aus Furcht vor den Russen. Der Krieg bekam nun eine andre Gestalt. Friedrichs Staaten waren von Feinden befreit, die Heiterkeit zog wieder in seine Seele. Er scherzte wie sonst, liess seine französischen Köche wieder kommen und suchte seine Flöte wieder hervor.—ARCHENHOLZ.

3. Mention the tendencies of the *Dichterbund* of Göttingen and its most prominent members.

4. What period of German literature is called the "Sturm und Drang period," and what writers took the lead in that movement?

5. Mention the chief works which gained for the following writers a place in the history of German literature:—Klopstock, Niebuhr, Grimmelshausen, Körner, Luther, J. von Müller.

DR. ATKINSON.

Translate the following into either French, Italian, or Spanish:—

The truth was, that, not very accessible to foreigners of any nation, or even to strangers among his own countrymen, the Marquis was peculiarly shy towards the English. A remnant of ancient national prejudice might dictate this feeling; or it might arise from his idea that they are a haughty, purse-proud people, to whom rank, united with straitened circumstances, affords as much subject for scorn as for pity; or, finally, when he reflected on certain recent events, he might perhaps feel mortified, as a Frenchman, even for those successes, which had restored his master to the throne, and himself to a diminished property and dilapidated chateau.

JUNIOR FRESHMEN.

Mathematics.

A.

LIMITED COURSE.

MR. WILLIAMSON.

1. Find the value of

$$\left(\frac{\sqrt{3} + \sqrt{-2}}{\sqrt{3} - \sqrt{-2}} \right)^2 + \left(\frac{\sqrt{3} - \sqrt{-2}}{\sqrt{3} + \sqrt{-2}} \right)^2.$$

2. The diagonal of a box is 125 inches, the area of the lid 4500 square inches, and the sum of three conterminous edges 215 inches. Find the lengths of the three sides.

3. Solve the simultaneous equations

$$x^2 + xy + y^2 = 37, \quad x^4 + x^2 y^2 + y^4 = 481.$$

4. Find
- x
- and
- y
- from the equations

$$\sin x + \cos y = 1, \quad \sin y + \cos x = \sqrt{3}.$$

5. In a plane triangle prove the formula

$$\tan \frac{A}{2} = \sqrt{\frac{(s-b)(s-c)}{s(s-a)}},$$

and write down the corresponding logarithmic equation.

6. A, B, C, together, perform a piece of work in a certain time; A alone could have performed it in 6 hours more, B alone in 15 hours more, and C alone in twice the time. How long did it occupy them?

DR. TRAILL.

7. Prove that the intersection of common tangents to two circles cuts the line joining their centres in the ratio of their radii. If the circles be outside each other, how many such points are there?

8. From one point of intersection of two circles, draw a line across them, so that the part intercepted between them shall be the greatest possible.

9. Solve the simultaneous equations,

$$(x-y)(x^2-y^2) = a,$$

$$(x+y)(x^2+y^2) = b;$$

and also the equations

$$(x^2+y^2) = (x+y)xy = axy.$$

10. Two bills, one of which is due in six months, the other in three, are discounted at 4 per cent. per annum. The discount on the first bill exceeds that on the second by £3, and the total sum realised is £235 16s. Find the amount for which the bills are drawn.

11. Adapt the following formulæ to logarithmic computation,

$$\begin{aligned}x &= \sqrt{a+b} \pm \sqrt{a-b}, \\x &= \sqrt{\frac{a+b}{a-b}} \pm \sqrt{\frac{a-b}{a+b}}, \\a \sin x + b \cos x &= c.\end{aligned}$$

12. Prove the following equations—

$$\begin{aligned}\tan \theta + 2 \tan 2\theta + 4 \tan 4\theta + 8 \cot 8\theta &= \cot \theta, \\ \tan 4\theta &= \frac{\sin \theta + \sin 3\theta + \sin 5\theta + \sin 7\theta}{\cos \theta + \cos 3\theta + \cos 5\theta + \cos 7\theta}.\end{aligned}$$

MR. PANTON.

13. A chord is drawn through a fixed point in a circle; prove that, as the chord varies, the square of the chord is proportional to the sum of the perpendiculars from its extremities on the polar of the point.

14. Find the area of an isosceles triangle whose side is a , and each of whose base angles is double the vertical angle.

15. Find the numerical values of

$$\cos 18^\circ, \cot 75^\circ, \sin 465^\circ.$$

16. The sides of a triangle a, b, c are 9.6, 12.8, and 16; find the numerical value of

$$\tan 2A + \tan 2B + \tan 2C.$$

17. Solve the equations

$$\begin{aligned}x^3 - y^3 &= 63, \\ x - y &= 3.\end{aligned}$$

18. Find the value of

$$\frac{x^3 - 13x - 12}{x^3 - 12x - 16}, \text{ when } x = 4.$$

B.

MR. WILLIAMSON.

1. Calculate to five decimal places the value of $\sin 1^\circ$ and $\cos 1^\circ$.

2. Prove that

$$\tan^{-1} \frac{1}{2} + \tan^{-1} \frac{1}{4} + \tan^{-1} \frac{1}{13} = \frac{\pi}{4}.$$

3. Find the locus of the middle points of a system of parallel chords in an ellipse.

4. If $x = y - \frac{y^3}{1.2.3} + \frac{y^5}{1.2.3.4.5} - \dots$, &c. Find y in terms of x by the method of reversion of series.

5. Find the values of

$$\cos x + \cos 3x + \cos 5x + \dots + \cos (2n-1)x,$$

and

$$\sin x + \sin 3x + \sin 5x + \dots + \sin (2n-1)x.$$

DR. TRAILL.

6. Given two conjugate diameters of an ellipse in magnitude and position, find the axes.

7. Find the locus of the foot of the perpendicular from the focus of a parabola on any normal.

8. If $a_0x^4 + 4a_1x^3 + 6a_2x^2 + 4a_3x + a_4 = 0$, find the transformed equation in X when

$$x = X - \frac{a_1}{a_0};$$

and write out the coefficients in terms of

$$H = a_0a_2 - a_1^2,$$

$$G = a_0^2a_3 - 3a_0a_1a_2 + 2a_1^3,$$

$$I = a_0a_4 - 4a_1a_3 + 3a_2^2.$$

9. If r be the radius of the circle inscribed to a spherical triangle (whose sides are a, b, c), and R the radius of the circumscribing circle, r and R being arcs on the sphere, prove

$$\tan r \cdot \tan R = \frac{2 \sin \frac{1}{2}a \cdot \sin \frac{1}{2}b \cdot \sin \frac{1}{2}c}{\sin \frac{1}{2}(a+b+c)}.$$

10. If $\sec \alpha \cdot \sec \theta + \tan \alpha \cdot \tan \theta = \sec \beta$,

find the value of $\tan \theta$; and, solve for $\tan \theta$ from the equation,

$$2 \tan \theta + \tan (\alpha - \theta) = \tan (\beta + \theta).$$

MR. PANTON.

11. Form the equation whose roots are the squares of the differences of those of

$$x^3 + qx + r = 0,$$

and determine from it in what cases the roots of the given equation are (1) all real and unequal; (2), one real, and two imaginary; (3), all real, and two equal; (4), all equal.

12. Solve, by Cardan's method,

$$x^3 + 3x^2 + 9x + 5 = 0.$$

13. Find the area of a triangle on the earth's surface whose angles are
- $93^\circ 20'$
- ,
- $85^\circ 30'$
- ,
- $73^\circ 10'$
- ;

assuming the earth's diameter to be 8000 miles.

14. If
- α, β, γ
- be the angles subtended by the sides of a plane triangle at the centre of the inscribed circle, prove

$$\sin A + \sin B + \sin C = 4 \sin \alpha \sin \beta \sin \gamma.$$

15. Prove that the product of the distances of any point on an ellipse from the foci is equal to the square of the semi-diameter parallel to the tangent at the point.

C.

MR. WILLIAMSON.

1. Given a focus, and the position of a pair of conjugate diameters of an ellipse, find its vertices by a geometrical construction.

2. Prove that the sum of the squares of a pair of conjugate diameters in an ellipse is constant.

3. Find, by trigonometry, the quadratic factors of the equation

$$x^n + 1 = 0.$$

4. Find the value of the symmetric function
- $\Sigma \frac{a}{\beta^2}$
- of the roots of an equation of the
- n^{th}
- degree.

5. Prove that

$$\frac{\sin x}{1 - 2a \cos x + a^2} = \sin x + a \sin 2x + a^2 \sin 3x + a^3 \sin 4x + \dots$$

where $a < 1$.

6. In a spherical triangle find an expression for the radius of its inscribed circle in terms of the angles of the triangle; and show that we can deduce from it the radius of the circumscribed circle in terms of the sides.

DR. TRAILL.

7. Find the locus of a fixed point on a line of given length which slides between two given lines at right angles to each other.

8. Given the focus of a parabola, and any tangent, find the locus of its vertex.

9. Given the base of a spherical triangle, and the difference between the vertical angle and the sum of the base angles; find the centre and radius of the circumscribing circle.

10. If a regular polygon of
- n
- sides be inscribed in a circle, find the value of the sum of the squares of all the lines drawn from one angle to each of the others.

11. If $a_0x^4 + 4a_1x^3 + 6a_2x^2 + 4a_3x + a_4 = 0$ be any biquadratic, and $A_0y^3 + 3A_1y^2 + 3A_2y + A_3 = 0$ its reducing cubic, prove the following relations :

$$A_0A_2 - A_1^2 = \frac{4}{3} (a_0a_4 - 4a_1a_3 + 3a_2^2)$$

$$A_0^2A_3 - 3A_0A_1A_2 + 2A_1^3 = 16 \begin{vmatrix} a_0 & a_1 & a_2 \\ a_1 & a_2 & a_3 \\ a_2 & a_3 & a_4 \end{vmatrix}$$

and hence deduce the discriminant of the biquadratic from that of the reducing cubic.

12. Show that there will be as many pairs of imaginary roots in any equation as there are changes in the signs of the leading terms of Sturm's auxiliary functions when none of them are wanting. If some of them be wanting, how is the number of real roots to be determined?

MR. PANTON.

13. Prove that the roots α, β, γ of the cubic

$$a_0x^3 + 3a_1x^2 + 3a_2x + a_3 = 0$$

are given, when all real, by the equations

$$a_0\alpha = -a_1 - 2\sqrt{H} \cos \frac{1}{3}\phi,$$

$$a_0\beta = -a_1 + 2\sqrt{H} \cos \left(\frac{\pi}{3} - \frac{1}{3}\phi \right),$$

$$a_0\gamma = -a_1 + 2\sqrt{H} \cos \left(\frac{\pi}{3} + \frac{1}{3}\phi \right),$$

where $H = a_1^2 - a_0a_2$, $G = a_0^2a_3 - 3a_0a_1a_2 + 2a_1^3$,

$$\text{and} \quad \cos^2 \phi = \frac{G^2}{4H^3}.$$

14. Find the condition that the biquadratic

$$a_0x^4 + 4a_1x^3 + 6a_2x^2 + 4a_3x + a_4 = 0$$

should have roots of the form

$$\alpha \pm \beta \sqrt{-1}, \quad \alpha \pm \gamma \sqrt{-1};$$

and solve the equation

$$x^4 - 4x^3 + 19x^2 - 30x + 50 = 0,$$

whose roots are of that form.

15. Denoting by r, r', r'', r''' the radii of the inscribed and exscribed circles of a spherical triangle, prove

$$\Sigma \tan r \tan r' = \sin b \sin c + \sin c \sin a + \sin a \sin b.$$

16. Find the sum of the infinite series

$$x \cos(\alpha + \beta) + \frac{x^2}{1.2} \cos(\alpha + 2\beta) + \frac{x^3}{1.2.3} \cos(\alpha + 3\beta) + \dots$$

17. Tangents are drawn to a parabola from a fixed point on the directrix; find the locus of the middle point of the line intercepted on a variable tangent by the fixed tangents.

18. Prove the following property of an ellipse :

$$\frac{L}{p^2} = \frac{2}{a} - \frac{1}{r},$$

where L is the semi-latus rectum, a the semi-axis major, r the radius vector from a focus to any point P on the curve, and p the perpendicular from the focus on the tangent at P .

Classics.

HERODOTUS.

MR. POOLE.

Translate the following passages:—

1. *Beginning*, "Ἔστι δὲ χωρίων αὕτη ἀπασίων μακρῶ, κ. τ. λ.
Ending, καὶ μὴ ἀπορρίψῃ ὁ καρπὸς τοῦ φοίνικος" Lib. i. cap. 193.
2. *Beginning*, 'Ἐπεὶν δὲ ἔλθωσι εἰς τὸν χῶρον οἱ Ἴνδοι κ. τ. λ.
Ending, τέκνων ἰνδιδόναι μαλακὸν οὐδέν. Lib. iii. cap. 105.
3. *Beginning*, "Ἴσος δὲ αἰεὶ ῥίει ἐν τε θέρει καὶ χειμῶνι, κ. τ. λ.
Ending, ὥστε ἴσον μιν αἰεὶ φαίνεσθαι ἰόντα. Lib. iv. cap. 50.
4. *Beginning*, 'Ἀποτειχίσας ὦν τὸν αὐχίνα τῆς, κ. τ. λ.
Ending, ἀλλὰ πανώλεθρος ἐξαπόλλυται. Lib. vi. cap. 37.
5. *Beginning*, Ταῦτα ἀκούσαντες οἱ τῶν Ἀθηναίων, κ. τ. λ.
Ending, μόνον ἀπόρρητον τελέθειν, τὸ σὲ τέκνα τ' ὀνήσει. Lib. vii. cap. 141.

1. What reasons does Müller give why the Greeks, as distinguished from the Oriental Nations, took so little care in recording their history?

2. In what respects does Herodotus, according to Müller, seem entitled to be classed as a writer of Epic Prose; and illustrate from Herodotus the points alluded to by Müller?

3. Herodotus notices a circumstance which shows the early devotion of the people of Ephesus to the worship of Diana?

4. From what kings did Cræsus endeavour to obtain aid against Cyrus? and point out how Herodotus makes a criminal act of Cræsus one of the main causes of his overthrow?

5. What early tragedy founded on contemporary events is alluded to by Herodotus?

6. How does Herodotus argue that it was the firmness of the Athenians which mainly saved Greece?

7. Herodotus, in mentioning the Persian Kings in whose reigns the greatest evils befel Greece, seems to allude to the Peloponnesian war? and give the dates of the periods of their reigns?

8. What induced the Samians to come to terms with Persia after the Ionic Revolt?

9. Τὰς δὲ νῆας οἱ ναύαρχοι ἀναγαγόντες ὅσον τε τίσσερα πλῆθρα ἀπὸ τοῦ ἁγίαλου ἀνεκώχεον, τὰς πρῶρας ἐς γῆν τρέψαντες πάντες μετωπηδόν.

Translate, and write a note on this passage.

10. Σὺ δὲ κείνους εἰς ὃ ἀποσπεύδων Ξέρξης στρατεύεσθαι ἐπὶ τὴν Ἑλλάδα ὥς δὲ κηδόμενος αὐτοῦ; ἀλλ' οὔτε ἐς τὸ μετέπειτα, οὔτε ἐς τὸ παρὺν κατὰ προῖξαι ἀποτρέπων τὸ χρεῖν γενέσθαι. Ξέρξης δὲ τὰ δεῖ ἀνηκουστίοντα παθεῖν, αὐτῷ ἱκύνῃ δεδήλωται.

Translate this passage, and state what circumstances it alludes to.

11. Give the Ionic forms for the following words:—

διατεταγμένοι ἦσαν, ὀρμώμενοι, ἀφίσταντο, σεαυτῷ, συνενεγεῖν, οἰκείος, μονομαχεῖν, ἐντεῦθεν.

12. Draw a map of the countries beyond the East of the Mediterranean, and mark on it the principal rivers, with the capitals of the great kingdoms mentioned by Herodotus, and the chief cities of Syria and Phœnicia?

MR. ARBOTT.

Translate the following passages:—

- Beginning*, Luce orta, quum plebis concilium esset,
Ending, in contumeliam ejus latam acceperunt.
- Beginning*, Dictator M. Junius Pera, rebus divinis perfectis,
Ending, C. Flamini translati erant, armavit.
- Beginning*, In ea castra Dasius Altinius Arpinus
Ending, et antiquam societatem respiciat.
- Beginning*, Tamen ipsi animis magis quam viribus resistebant:
Ending, interiorum murum haberent.

1. Mommsen compares Rome and Carthage as to their constitution and treatment of their subjects; specify the chief points of contrast.

2. According to Mommsen, the disaster at Cannæ was the consequence of political errors of the Romans?

3. What was the effect of the Hannibalic war on the position of the allies and the Latins?

4. What are the differences in signification between the following words and their English derivatives :—*repeto*, *contendo*, *auctor*, *celebratus*, *gloriosus*?

5. What is the origin of the tense inflections of the Latin imperfect conjunctive and pluperfect conjunctive?

6. What are the etymological affinities of *vox*, *oculus*, *silva*, *adagium*?

MR. MAHAPPY.

Translate the following passage into Latin Prose :—

But he continued to halt between two opinions, and was in a state of painful irresolution as to the line of conduct he should adopt, taking Atticus into his counsels, and confiding to that tried and trusted friend all his anxieties and fears.

It was about this time, or perhaps earlier, that Quintus and Pomponia, who must have long been heartily sick of each other, put an end to their matrimonial squabbles by a divorce. Quintus, who seems to have been generally in money difficulties, was hard pressed to find the means of restoring his wife's dowry—the inevitable consequence of a divorce under the Roman law. A rumour got abroad that he intended to marry another lady, named Aquilia, but Cicero said that his brother was utterly averse to the thought of a second marriage, and, in the joy of his newly-acquired freedom, declared that nothing was more delightful than a bed all to himself.

Translate the following passage into Greek Prose :—

O happy death, which, due to nature, has been paid rather as a debt due to your country! But I deem you men who were born for your country: your very name was derived from Mars, so that the same deity seems to have created this city for the world, and you for this city. Death in flight from the battle field is disgraceful, but glorious in victory, for Mars himself usually selects the bravest from the ranks. Those impious wretches whom ye slew will pay the penalty of their parricide in the infernal regions; while you who have breathed out your latest breath in victory have gained the dwelling-place and home of the blessed. Brief is the span of life, given us by nature; but the memory of a life nobly rendered is immortal. And if indeed it were no longer than this life of ours, who would be such an idiot as to face the extremity of toil and danger in order to win the highest glory and renown.

It is well then, soldiers, with you—the bravest of the brave while you lived, but now sanctified by death. For your merit can never lie unpulchred, either by the oblivion of those who now exist, or the silence of posterity, when the Senate and Roman people have raised to you, almost with their own hands, an imperishable monument.

Translate the following passage into Latin Verse :—

Muses, no more can I forbear to sing
 What help, what joys I to Acilius owe,
 Lest Time, his love no more remembering,
 The veil of dark oblivion o'er it throw.
 To you will I proclaim it ; and do you
 To myriads numberless the tale rehearse ;
 And, to resound his praises, still renew,
 When it is old, the music of my verse !
 So when the tomb shall claim him, he shall leave
 A still increasing heritage of fame,
 And her fine web no pendent spider weave
 Across Acilius' unregarded name.

Translate the following passage into Greek Verse :—

Arise, cry out in the night : in the beginning of the watches pour out thine heart like water before the face of the Lord : lift up thy hands toward him for the life of thy young children, that faint for hunger in the top of every street. Behold, O LORD, and consider to whom thou hast done this. Shall the women eat their fruit, and children of a span long ? shall the priest and the prophet be slain in the sanctuary of the Lord ? The young and the old lie on the ground in the streets : my virgins and my young men are fallen by the sword ; thou hast slain them in the day of thine anger ; thou hast killed, and not pitied. Thou hast called as in a solemn day my terrors round about, so that in the day of the LORD's anger none escaped nor remained : those that I have swaddled and brought up hath mine enemy consumed.

English Literature and Composition.

MR. BARLOW.

A.

1. Describe, after the manner of Lamb, the characters of James and Bridget Elia.
2. Write a short review of Goldsmith's "Traveller." Illustrate your remarks, whenever you can, by quotations from the poem.
3. Write notes on the following passages :—
 - (a.) "Live thou, whose infamy is not thy fame!
 Live ! fear no heavier chastisement from me,
 Thou noteless blot on a remembered name !
 But be thyself, and know thyself to be !"

- (b.) "—— the fading melodies,
With which, like flowers that mock the corse beneath,
He had adorned and hid the coming bulk of death."
- (c.) "The Pilgrim of Eternity, whose fame
Over his living head like Heaven is bent,
An early but enduring monument,
Came, veiling all the lightnings of his song
In sorrow."
4. Point out as many parallels as you can between Johnson's "London" and the third satire of Juvenal.
5. Give the description of the Cave of Spleen—"Rape of the Lock," Canto iv.
6. Give some account of the life and writings of Henry Fielding.
7. Name the principal characters in the following Waverley Novels: (a) "Redgauntlet," (b) "The Pirate," (c) "Kenilworth," (d) "The Fortunes of Nigel."
8. Compare the Letters of Lady Mary Wortley Montagu with those of Madame de Sevigné.
9. Briefly describe the contents of the "History of the Decline and Fall of the Roman Empire."
10. Write a note on the *style* of the Essays of Elia.

B.

1. Charles Lamb asserts that the Scotch have never forgiven Smollett for his "Roderick Random." "Speak of Smollett as a great genius, and they will retort upon you Hume's History compared with his continuation of it." What is Lamb's comment on this retort?
2. Fuller's description of the negro, and Lamb's opinion of them?
3. Origin of the custom of saying grace before meals, according to Elia?
4. In the essay "Grace before Meat" Elia contrasts two passages in "Paradise Regained." For what purpose?
5. "Epistolary matter usually compriseth three topics"?
6. In what lines does Gray refer to Milton's blindness?
7. In what poem do the following lines occur:
"Awakening up, he took her hollow lute,—
Tumultuous,—and, in chords that tenderest be,
He play'd an ancient ditty, long since mute,
In Provence called 'La belle dame sans mercy.'"
8. And these:
"The chest contrived a double debt to pay,
A bed by night, a chest of drawers by day?"
9. Meaning of *unexpressive* in the Hymn on the Nativity:
"Harping in loud and solemn quire
With unexpressive notes to Heav'n's new-born Heir."

10. The word occurs in Lycidas with the same signification?

11. "Heywood and Shirley were but types of thee,
Thou last great prophet of tautology."

What does Lamb say of Heywood?

12. "This Partridge soon shall view in cloudless skies,
When next he looks thro' Galileo's eyes."

What became of Partridge, according to Swift?

13. Quote the two next lines of the poem.

14. In what lines do Dryden and Collins describe the organ?

15. "And still they gazed, and still the wonder grew,
That one small head could carry all he knew."

To whom do these lines refer?

16. Date of death of Samuel Johnson?

17. Of Sir Walter Scott?

18. Of John Locke?

19. Who wrote the Battle of the Books, and when?

20. Who wrote the "Machinæ Gesticulantes"?

21. Fielding wrote a novel as a kind of parody upon a novel of Richardson's. What were these novels?

22. In what work does the character Lismahago occur?

23. Who was Peter Pindar?

24. What are the best known plays of David Garrick?

25. According to Scott's own judgment on what, mainly, does the interest of the *Lay*, *Marmion*, and the *Lady of the Lake*, respectively depend?

26. Byron wrote a parody of "Who killed Cock Robin." What was the subject of this parody?

27. What is the subject of "Alastor"?

28. Who was the author of the *Noctes Ambrosianæ*?

29. Mr. Shaw writes: "Whoever desires to know the interior life of that vast and admirable body the rural gentry of England must read"—What?

30. Who was the author of "My Schools and Schoolmasters"?

ENGLISH LITERATURE.

PROFESSOR DOWDEN.

1. What are the *Idola* of Bacon?

2. What plays of Shakspeare owe their plots to the following sources:—

(a). Paynter's Palace of Pleasure.

(b). Greene's Dorastus and Fawnia.

- (c). Chaucer.
- (d). The Menæchmi of Plautus.
- (e). Lodge's Rosalynde.

3 (a). What is the description of inseparable girl-friends in "As You Like it" ?

(b). Reproduce, as far as you can in Shakspeare's language, the account given by Jacques of his meeting with Touchstone.

4. In what connection do the following words occur :—

- (a). "The tune of Imogen."
- (b). "A touch more rare
Subdues all pangs, all fears."
- (c). "Revenged !
How should I be revenged ?"
- (d). "Reverence,
That angel of the world."

5. What indication is there in the play of Cymbeline that the song
"Fear no more the heat o' the sun,"

was an after insertion ?

6. Explain the following words as used by Shakspeare :—feat (adj.), imperseverant, crare, peevish, importance, capable, to make an extent, warp.

7 (a). What is the thought of Wordsworth's sonnet suggested by a star setting behind a mountain ?

(b). The Naiad is not to Wordsworth a type of the dancing brook.
How does this sonnet proceed ?

(c). Bring together some other passages which illustrate Wordsworth's thoughts or moods induced by streams.

8. What is Mr. Tennyson's conception of true political freedom ?

9. Illustrate by a few well-chosen examples from Mr. Tennyson's poems the colouring,—glad or sad,—added to the phenomena of nature by human sentiment and passion.

-10. What are Mr. M. Arnold's statements with respect to

- (a). The chief gift to England made by S. T. Coleridge ?
- (b). Mr. Carlyle's criticisms of German literature ?
- (c). Shelley's genius ?
- (d). The character of Pascal's intellect ?

Answer briefly the following questions :—

1. In what poem does Tennyson describe the calm of the careless gods ?

2. To what is the voice of Cleopatra, to what is the voice of Jephthah's daughter, compared in "A Dream of Fair Women" ?

3. Knowledge of the methods and instruments of Art keeps one for a time from entering into the *subject* of a work of Art. Where does Tennyson record his experience of this fact?

4. "Liberal applications lie
In Art like nature."

What is the meaning of this?

5. How does the poem "Recollections of the Arabian Nights" end?

6. Skiddaw is nobler than Parnassus. What aspect of the mountain does Wordsworth's imagination here select as most sublime?

7. "The first cuckoo's melancholy cry."

In what connexion does this description of the cuckoo's cry occur?

8. "Like a bold girl, who plays her agile pranks
At Wakes and Fairs with wandering Mountebanks—
When she stands cresting the Clown's head."

What, in Wordsworth's fancy, assumes a resemblance to this girl?

9. "When solitary Nature condescends
To mimic time's folorn humanities."

What is the line (containing the idea of the sonnet) which immediately precedes these lines?

10. Gilbert Shakspeare remembered to have seen his brother William as an actor. In what character and incident?

11. "The inexpressive she."

Give a parallel instance of the use of the word "inexpressive" from Milton.

12. "It is the right butter-woman's rank to market." What is?

13. "Truly, young gentlemen, though there was no great matter in the ditty, yet the note was very untuneable." What is the ditty?

14. One soliloquy of Belarius is highly undramatic, being obviously addressed to the spectators in the theatre?

15. Cloten on one occasion seems to rise above himself?

16. What lines of Cornelius may be quoted as a just objection to the vivisection of animals?

17. What are the first words of Imogen addressed to Posthumus after he has struck her to the ground?

18. Sir John Mandeville's Travels is a translation of a translation?

19. What historical person is meant by Spenser's Sir Arthegall?

20. The story of Palamon and Arcite has been treated by five English poets?

21. Dates of publication of "Venus and Adonis" and of "The Rape of Lucrece"?

22. What example does Mr. M. Arnold give of Shakspeare's power of magically interpreting external nature?

23. What has David Gray written?

24. What, according to Goethe, was the deficiency of Heine?

25. "A man who alone in Oxford . . . conveyed to us in his genius that same charm, that same ineffable sentiment, which this exquisite place itself conveys." Who is referred to?

Modern Languages.

FRENCH.

MR. BARLOW.

Translate the following passages :—

(a). Après la mort de Louis XIII. la régente, dit M. Michelet, ouvre son triste regne par un chemin de fleurs, sans qu'on sache pourquoi ni comment, cette étrangère est adorée. Elle est femme et elle a souffert : les cœurs sont attendris d'avance, ses malheurs lui sont comptés presque pour des vertus ; elle est faible : chacun espère en profiter. Avec cette Espagnole déjà mûre (quarantedeux ans), mais de bonne mine et de manières agréables, ce sera un règne galant. Mais qui sera le préféré ? Cette loterie d'amour autorise l'infini des rêves . . . En attendant, tout tourne à son profit. Le dernier favori du roi défunt, Condé, fait à Rocroy la brillante préface du règne emphatique de Louis XIV. C'est l'enfant, c'est la régente qui en ont l'honneur. Heureuse reine qui gagne des batailles en bercant son fils . . . C'était une merveille inouïe de voir la gloire inaugurer le gouvernement d'une femme, d'un enfant, gouvernement dont l'idée s'associe d'ordinaire à celle de la faiblesse et de l'impuissance.

Ce grand bonheur fit deux malheurs : il créa un héros insatiable et insupportable, monté sur des échasses et prêt à tout tuer pour la moindre prétention d'orgueil ou d'intérêt ; d'autre part, il glorifia l'avènement de Mazarin et affermit son pouvoir. La Fronde et toutes ses misères sont là en germe.

(b). Mon Dieu ! que votre esprit est d'un étage bas !
 Que vous jouez au monde un petit personnage,
 De vous claquemurer aux choses du ménage,
 Et de n'entrevoir point de plaisirs plus touchants
 Qu'une idole d'époux et de marmots d'enfants !
 Laissez aux gens grossiers, aux personnes vulgaires,
 Les bas amusements de ces sortes d'affaires.
 A de plus hauts objets élevez vos désirs,
 Songez à prendre un goût des plus nobles plaisirs,
 Et, traitant de mépris les sens et la matière,
 A l'esprit, comme nous, donnez-vous tout entière.
 Vous avez notre mère en exemple à vos yeux,
 Que du nom de savante on honore en tous lieux :
 Tâchez, ainsi que moi, de vous montrer sa fille ;
 Aspirez aux clartés qui sont dans la famille,
 Et vous rendez sensible aux charmantes douceurs
 Que l'amour de l'étude épanche dans les cœurs.

DR. ATKINSON.

1. State what you know of the works of Chateaubriand.
2. Did Corneille write comedies?
(b) give the names of as many of his plays as you can.
3. Write some account of the state of the French drama before Corneille.

4. Translate into English :—

- (a) pourquoi suis-je Romaine ? ou que n'es-tu Romain ?
- (b) elle se prend au ciel, et l'ose quereller.
- (c) autre de plus de morts n'a couvert notre terre.
- (d) ma constance à regret s'évertue.
- (e) pour ébranler mon cœur, est-ce peu de Camille ?
- (f) ma mort le préviendra, de qui que je l'obtienne.
- (g) vous ne les aurez point au combat occupés,
que ce corps au milieu n'arrête vos épées.
- (h) ainsi Rome n'a point séparé son estime ;
elle eût cru faire ailleurs un choix illégitime.
- (i) je mets à faire pis, en l'état où nous sommes.
- (k) on briguerait en foule une si belle mort.

5. What is the origin of these words :—

jadis, beau-frère, malheur, épée, même, âge,
combler, aveugle, désormais, dorénavant.

6. Put together in a connected form all you know of the uses of the subjunctive mood in French.

7. Write sentences (with translation) showing the distinction between *quoique* and *quoi que* ; *quelque* and *quel que* ; between *s'occuper* (*d, de*) ; *aider* and *aider à* ; *ne faire que* and *ne faire que de* ; *commencer* (*d, de*) ; *d terre* and *par terre* ; *anoblir* and *ennoblir*.

8. Give the pres. pte., the sg. pret. (passé def.), and the pres. subj. (sg. and pl.) of these verbs :—

traire, vivre, voir, taire, résoudre, nuire, croître, haïr, prendre, naître, ceindre.

9. Describe at some length (in French) Calypso's cave.

10. Write (in French) a short notice on Télémaque, giving some account of (the author, his aim, the contents of the book, style, &c.)

Translate the following passage into English :—

Chaque soir nous allumions un grand feu, et nous bâtions la hutte du voyage avec une écorce élevée sur quatre piquets. Si j'avais tué une dinde sauvage, un ramier, un faisan des bois, nous le suspendions devant le chêne embrasé, au bout d'une gaulle plantée en terre, et nous abandonnions au vent le soin de tourner la proie du chasseur. Nous mangions

des mousses appelées tripes de roches, des écorces sucrées de bouleau, et des pommes de mai qui ont le goût de la pêche et de la framboise. Le noyer noir, l'érable, le sumac, fournissaient le vin à notre table. Quelquefois j'allais chercher parmi les roseaux une plante, dont la fleur allongée en cornet contenait un verre de la plus pure rosée. Nous bénissions la Providence qui, sur la faible tige d'une fleur, avait placé cette source limpide au milieu des marais corrompus, comme elle a mis l'espérance au fond des cœurs ulcérés par le chagrin, comme elle a fait jaillir la vertu au milieu des misères de la vie.—*ATALA*.

GERMAN.

PROFESSOR SELSS.

1. Translate into German :—

Last month the inhabitants of Austria were agreeably surprised by the return of some of their countrymen who had been in the Arctic Ocean, with the intention of discovering a way to the north pole. It was in June, 1872, when this expedition had left Triest in the "Tegetthoff," under the orders of Captains Payer and Weyprecht, and with a crew of twenty-three Dalmatian sailors and Tyrolese mountaineers. Besides provisions for two years, they had several sledge-boats, fit to travel by either land or sea, and a number of dogs to assist in drawing. This strange equipment (*Ausstattung*) was the chief means of saving their lives. On the north coast of Novaja Semlja they were hemmed in between pieces of ice, and drifted northward for fourteen months. At the end of this time they saw a large new continent which they called "Franz-Josef'sland." They travelled on it in sledges to within seven degrees from the north pole; but owing to the roughness of the glacier ground before them, could not proceed any further. Meantime their ship lay between the ice, three miles off the coast. They finally abandoned the "Tegetthoff" in that condition, and after the loss of only one man, who died of consumption, returned in four sledge-boats over drift-ice and through the open sea, to Novaja Semlja, whence a Russian schooner took them to Norway.

2. Translate into English :—

Friedrich hatte sich, als er die Schlacht bei Kollin verloren sah, sofort unter geringer Bedeckung auf den Weg nach Nimburg gemacht. Der abendliche Ritt war sehr gefährvoll, denn rings in Dörfern und Gebüschen lagen feindliche Husaren und Kroaten zerstreut. Auch erhob sich während des Ritts plötzlich das Gerücht, es seien österreichische Husaren im Anzuge. Man sah sich genöthigt, eine halbe Stunde mit verhängtem Zügel fortzujagen. In einem Dorfe musste man darauf kurze Rast machen, um die erschöpften Pferde zu tränken. Ein alter verwundeter Kavallerist reichte dem Könige in seinem Hute einen kühlen Trank, den er aus dem Pferde-Eimer geschöpft hatte, mit den Worten: "Trink Ew. Majestät doch und lass Bataille Bataille sein; es ist nur gut dass Sie leben, unser Herrgott lebt, der kann uns wieder Sieg geben." Friedrich setzte sich auf eine Brunnen-Röhre. Seine Officiere fanden ihn, den Blick starr auf den Boden geheftet und mit seinem Stock

Figuren in den Sand zeichnend. Niemand wagte ihn zu stören. Endlich sprang er auf und gab mit Fassung und erzwungener Heiterkeit die nöthigen Befehle. Beim Anblick des kleinen Restes seiner geliebten Garde traten ihm Thränen in die Augen. "Kinder," rief er, "ihr habt heute einen schlimmen Tag gehabt." Sie antworteten, sie seien leider nicht gut geführt worden. "Nun, habt nur Geduld," fuhr Friedrich fort, "ich werde Alles wieder gut machen."—(Kugler.)

3. Mention Goethe's critique of Uhland, and discuss its fairness.
4. Give some particulars on Uhland's birthplace, occupation, and death. In what years were his best poems composed?
5. Mention the members and the tendencies of the Swabian school of poetry.
6. Who was "Eberhard der Greiner" of whom Uhland has sung?
7. State the contents of the poems from which the following lines are taken:—

- (a.) Da wallt dem Schwaben auch sein Blut,
Er trifft des Türken Pferd so gut.
- (b.) Nicht in kalten Marmorsteinen,
Nicht in Tempeln dumpf und todt,
In den frischen Eichenhainen
Webt und rauscht der deutsche Gott.
- (c.) Sie sangen von Gottesminne, von kühner Helden Muth,
Von lindem Liebessinne, von süsser Maienbluth.
- (d.) Bleib du im ew'gen Leben, mein guter Kamerad.
- (e.) Frau Berta sass in der Felsenkluft.

DR. ATKINSON.

To be translated into French, Italian, or Spanish:—

Charles the Sixth had instituted this celebrated body, the Archers, as they were called, of the Scottish Body-guard, with better reason than can generally be alleged for establishing round the throne a guard of foreign and mercenary troops. The divisions which tore from his side more than half of France, together with the wavering and uncertain faith of the nobility who yet acknowledged his cause, rendered it impolitic and unsafe to commit his personal safety to their keeping. The Scottish nation was the hereditary enemy of the English, and the ancient, and, as it seemed, the natural allies of France. They were poor, courageous, faithful—their ranks were sure to be supplied from the superabundant population of their own country, than which none in Europe sent forth more or bolder adventurers. Their high claims of descent, too, gave them a good title to approach the person of a monarch more closely than other troops, while the comparative smallness of their numbers prevented the possibility of their mutinying, and becoming masters where they ought to be servants.

EXAMINATION FOR THE DEGREE OF BACHELOR OF ARTS.

Moderatorships in Mathematics and Mathematical Physics.

Examiners.

ANDREW S. HART, LL. D.

MICHAEL ROBERTS, M. A., Professor of Mathematics.

RICHARD TOWNSEND, M. A., Professor of Natural Philosophy.

ANTHONY TRAILL, LL. D.

ARTHUR W. PANTON, M. A.

PLANE GEOMETRY.

DR. HART.

1. Find the locus of intersection of tangents to a conic which intercept a given length on a given tangent.
2. A variable tangent to a conic cuts two fixed lines at A and B ; find the locus of intersection of two other tangents drawn from A and B .
3. Find the equation of the conic which passes through the points of contact of all common tangents to two given conics.
4. Investigate the relation between the lengths of common tangents to five given circles.
5. Find all the singular points on the curve $x^3 + y^3 = A^3$.
6. Given the degree and class of a curve, state and prove the expression for the difference between the numbers of double points and of double tangents.
7. Show how to form the equation of the system of tangents from a given point to a given curve.
8. Prove that the class of the evolute of a curve is generally equal to the sum of the degree and class of the curve, and investigate the exceptions to this rule.
9. Find the caustic by refraction of a circle, the radiant being a given point.
10. If a cubic A passes through seven points of inflexion of another cubic B , prove that one of these points is a point of inflexion of A .
11. State and prove the method of determining the tangential of any point on a cubic by means of the Hessian of the cubic.
12. Define the Cayleyan of a cubic, and determine its class and degree.

DIFFERENTIAL EQUATIONS.

MR. M. ROBERTS.

1. Integrate the equation

$$y^2 \frac{d^2 y}{dx^2} = 2 \frac{dy^3}{dx^3} \left(2y^3 + \frac{2}{y^3} - x \right),$$

by transforming it so that x may be the dependent variable, and y the independent variable.

2. Integrate the equation

$$4y^3 \frac{d^2 y}{dx^2} = x \frac{dy^3}{dx^3}.$$

3. Integrate the equation

$$3 \frac{d^2 y}{dx^2} \cdot \frac{d^4 y}{dx^4} = 5 \left(\frac{d^3 y}{dx^3} \right)^2.$$

4. Integrate by differentiation the following equation :

$$(x^2 - ky + a^2) \frac{dy^2}{dx^2} + a \sqrt{1 + \frac{dy^2}{dx^2}} \left(2x \frac{dy}{dx} + k \right) + x^2 - ky = 0.$$

5. The linear equation

$$x^3 \frac{d}{dx^3} - 2x^2 \frac{d^2 y}{dx^2} + x(x^2 - 2) \frac{dy}{dx} + 2(4 - x^2)y = 0$$

has $\sin x + \frac{\cos x}{x}$, $\cos x - \frac{\sin x}{x}$ for particular integrals; find the complete solution.

6. If $U = \frac{d^2 y}{dx^2} - \frac{y}{x^4}$, prove that $Uxe^{-\frac{1}{x}} dx$ is a perfect differential, and find the value of

$$\int Uxe^{-\frac{1}{x}} dx.$$

7. Adopting the usual notation for partial differential coefficients of two independent variables, find a complete primitive of the equation

$$px + q = z^m pq.$$

8. Integrate the partial differential equation of the first order

$$p \sqrt{1 - x^2} - q \sqrt{1 - y^2} = \frac{z(y \sqrt{1 - x^2} - x \sqrt{1 - y^2})}{x^2 + xy}.$$

9. Integrate by Monge's method the partial differential equation of the second order

$$qxr = (px + qy)s + pyt + 2pq = 0.$$

10. Let $ae - 4bd + 3c^2 = I$, $ace + 2bcd - ad^2 - eb^2 - c^3 = J$, determine by means of these quantities the equation of the squares of the differences of the roots of the reducing cubic (in Euler's method) of

$$ax^4 + 4bx^3 + 6cx^2 + 4dx + e = 0,$$

and find the condition that it should reduce itself to a binomial equation.

GEOMETRY OF THREE DIMENSIONS.

DR. TRAILL.

1. Express the volume of a tetrahedron in terms of,
 - (a). The co-ordinates of its vertices.
 - (b). The lengths of its six edges.
2. Find the condition that the quadric represented by the general equation, should be touched by the line

$$\frac{x - x'}{\cos \alpha} = \frac{y - y'}{\cos \beta} = \frac{z - z'}{\cos \gamma}.$$

3. If two quadrics touch along a plane curve, the tangent plane at an umbelic of one, cuts the other in a conic having that umbelic for a focus, and the line of intersection of the tangent plane and the plane of contact, for a directrix.

4. Through a given line, planes are drawn touching a system of confocal surfaces, find the surface generated by the corresponding normals, and prove that the same surface is generated by the corresponding polar lines.

5. Find the equation which determines the axes of the section of the ellipsoid

$$\frac{x^2}{a^2} + \frac{y^2}{b^2} + \frac{z^2}{c^2} = 1$$

by the plane

$$Ax + By + Cz = 0.$$

6. Find the locus of all points on a hyperboloid of one sheet, at which the rectilinear generatrices are at right angles.

7. Given three conjugate diameters of a central quadric, determine the magnitude and direction of its axes.

8. If a plane section of a surface of the second degree, cut a focal conic and its plane at right angles, prove that the point of intersection is a focus of the section, and find the locus of the other focus.

9. Find the locus of the vertices of right cones enveloping a series of confocal surfaces.

10. Prove that the focal lines of the system of cones subtended at any point by a system of confocal surfaces, are the rectilinear generators of the hyperboloid which passes through the point.

11. If one system of lines of curvature on any surface be plane curves, prove that the second sheet of the surface of centres possesses the same property.

12. Find an envelope of the sphere.

$$(x - \alpha)^2 + (y - \beta)^2 + z^2 = r^2$$

which shall pass through the right line

$$x = mz, y = 0.$$

PROBLEMS.

DR. HART.

1. Describe a conic which shall pass through the four vertices of a given parallelogram, and touch a given conic concentric with the parallelogram.

2. Find the equation of the Cayleyan of the cubic

$$x^4y + y^4z + z^4x + 2mxyz = 0.$$

3. Compute the invariants of this cubic.

MR. M. ROBERTS.

4. At any point of a curve the conic of five-point contact is an ellipse, hyperbola, or parabola, according as

$$5 \left(\frac{d^3y}{dx^3} \right)^2 - 3 \frac{d^2y}{dx^2} \cdot \frac{d^4y}{dx^4}$$

is negative, positive, or zero.

5. Find the orthogonal trajectory of the series of curves formed by the intersection of tangents to a system of confocal ellipses which cut under a constant angle.

6. Find the general expression for a function of the differences of the roots of a biquadratic, which is of the sixth degree in the coefficients of the equation, and of the eighth in the roots.

DR. TRAILL.

7. Transform the equation of an ellipsoid, so as to have the three normals to the three confocals through any point, for axes of co-ordinates.

8. Prove that the locus of the centre of a sphere touching three given spheres is a conic; and that the locus, on each of the given spheres of the points of contact of all possible spheres so described, is a circle.

9. Let $\nu_1 = \alpha$ be the hyperboloid, which gives a certain line of curvature on the ellipsoid (ρ); take any geodesic touching this line of curvature, and let μ, ν be the two confocal hyperboloids at any point on this geodesic; draw any common tangent line to these two hyperboloids, and through this line draw a tangent plane to the hyperboloid $\nu_1 = \alpha$. Prove that the angle between this plane and the tangent plane to the hyperboloid (ν), at the point where the common tangent touches it, is equal to the angle between the geodesic and the line of curvature (ρ, ν).

STATICS.

[POISSON.—JELLETT.—WALTON.]

MR. TOWNSEND.

1. For a system of material particles, connected only by conditions, and acted on only by forces, capable of being expressed by equations involving no other variables than their co-ordinates; give any complete proof of the general equation of equilibrium of the entire system in its ordinary form.

2. From the particular equations of equilibrium of the several particles of such a system, show that the absolute directions, and the relative magnitudes, of the several internal forces arising from the restraints to which the particles are subjected, depend, for each equation of connection, only on the configuration of the system in each position of equilibrium.

3. The extremities of a heavy uniform beam rest, one on a rough horizontal plane, and the other against an equally rough circular cylinder touching the plane along a line perpendicular to the beam; given all particulars, required the minimum coefficient of friction consistent with the equilibrium of the system under the action of gravity.

4. Assuming equal coefficients of friction at the two points of resistance, in the attempt to withdraw from its recess an ordinary rectangular drawer by a pull at one of its handles; required the conditions that the equilibrium of the drawer, under the action of the three forces, should be necessary, impossible, or intermediate.

5. A flexible cord or chain of uniform thickness being supposed strained on a fixed surface of uniform roughness, general forces acting along its entire length in contact with the surface, and particular forces acting in addition at its extremities; investigate the general equations of its equilibrium.

6. In the particular case of a thin flexible chain, coiled partially round a thick horizontal cylinder of uniform roughness, and held in equilibrium by its own weight; given, with all other particulars, the length l of the shorter of its two vertical terminals, determine the greatest possible length l' of the longer consistent with equilibrium.

7. An elastic rod or bar of uniform structure, cylindrical or prismatic in its original form, being supposed acted on by general forces along the entire length of its axis of inertia, as well as by particular forces at both its extremities; investigate the general equations of its equilibrium.

8. In the particular case of a thin rectangular bar, supported but not fixed in a horizontal position by two terminal props, and bent slightly by its own weight; given all particulars, determine approximately the form and dip of its curve of strained equilibrium.

9. Investigate, by any method, the ordinary formulæ for the components, parallel to its axes, of the attraction of a uniform solid ellipsoid, for the law of the inverse square of the distance, at any point internal to its mass.

10. Apply the preceding formulæ, in their ordinary or in any other forms, to show that the ellipsoidal is always a possible form of relative

equilibrium, in the uniform rotation, round a fixed axis, of a mass of homogeneous incompressible fluid held together by its own attraction for the aforesaid law of distance.

11. The velocity of rotation of the fluid, in the preceding question, being supposed very small, show that the ellipsoid satisfying the conditions of relative equilibrium is necessarily of revolution; and determine the value of its ellipticity in terms of the density and velocity of rotation of the fluid.

12. To a velocity of rotation supposed on the contrary to be finite, show, on the other hand, that there is always a limit beyond which the ellipsoid can no longer be of revolution; and explain how, for a given density of the fluid, the limiting form of revolution and corresponding velocity of rotation may be approximately determined.

DYNAMICS.

[POISSON.—JELLELT.—WALTON.]

MR. TOWNSEND.

1. In the motion of a material particle on a uniformly rough inclined plane, under the action of gravity, show that the trajectory of the particle may in general be represented by a system of two equations, involving each one of its two co-ordinates in the first degree, with a third variable to be eliminated between them.

2. Two material particles, resting on a rough inclined plane, and connected by a slight flexible cord passing without friction through a small ring attached to a fixed point on the plane, are in equilibrium under the action of gravity; the inclination of the plane being supposed gradually increased, or its roughness gradually diminished, determine, given all particulars, the nature of the initial motion of the particles.

3. Two material particles, moving without friction in two non-intersecting rectilinear tubes of indefinite length, attract each other with a force varying directly as their distance asunder; given all initial particulars, determine completely their motion.

4. In the small oscillations of a simple pendulum, in a medium resisting as the square of the velocity; given all particulars, determine the laws of diminution of the several successive semi-arcs of vibration, and of the several velocities of passage through the point of equilibrium.

5. In the small oscillations of any system of material particles, connected only by conditions, and acted on only by forces, capable of being expressed by equations involving no other variables than their co-ordinates; shew that the determinant, whose roots give the periods of harmonic vibration of the system, is in general symmetrical.

6. A universal pendulum, suspended from a fixed point rigidly connected with its mass, performs small oscillations under the action of gravity; given all particulars, investigate the aforesaid determinant, and construct the axes of harmonic vibration, for the point.

7. In the rotation of a rigid body round a fixed point, any external forces acting; investigate, by any method, the Eulerian equations for

the angular accelerations round the principal axes of the body at the point ; and explain, at the same time, the dynamical significations of their second terms.

8. For the particular case of the preceding when no external forces act ; state and prove Poinot's representation, geometrical and kinematical, of the motion of the body, by means of the momental ellipsoid of the body at the point.

9. Two rigid bodies, moving in the most general manner freely in space, become suddenly connected with each other by an inextensible cord of insensible mass ; given all particulars, required the impulsive strain on the cord.

10. In the longitudinal vibrations of a uniform elastic bar, fixed at one extremity and free at the other ; shew how to determine the forms of the arbitrary functions, involved in the equations of propagation of the two systems of waves, from the particulars of the initial disturbance, supposed of limited extent.

11. Two different lengths l and l' of the same uniform elastic bar, moving with different velocities v and v' in the same right line, come in longitudinal collision with each other ; both lengths being supposed free from vibration before collision, determine their states of vibration after.

12. Investigate the general equations of the propagation of sound in a medium extending indefinitely in unlimited space ; the accelerating forces developed by displacement, and the molecular velocities resulting from their action, being supposed both to have potentials.

LUNAR THEORY.

MR. PANTON.

1. How does Newton construct the conic described round a centre of force in the focus ; the distance, velocity, and angle of projection being given ?

Show that the axis major of the orbit described is independent of the direction of projection.

a. Prove the differential equation of the Moon's radius vector, viz.,

$$\frac{d^2u}{d\theta^2} + u = \frac{\frac{P}{h^2 u^2} - \frac{T}{h^2 u^3} \frac{du}{d\theta}}{1 + 2 \int \frac{T}{h^2 u^3} d\theta}.$$

3. Find expressions for the forces P , T , S to the second order of approximation.

4. Explain generally in what cases terms of an order beyond the second must be retained in the differential equations in order to obtain a correct approximation to the second order.

Find the coefficient of the term in the Moon's radius vector whose argument is

$$(2 - 2m - 2c) \theta - 2\beta + 2\alpha,$$

and show that this term disappears from the expression for the longitude in terms of the time.

5. Assuming

$$u = a \left\{ 1 - \frac{1}{2}m^2 + e \cos(c\theta - \alpha) + m^2 \cos(2 - 2m\theta - 2\beta) + \frac{1}{8}me \cos(2 - 2m - c\theta - 2\beta + \alpha) \right\},$$

prove

$$\begin{aligned} \theta = pt + 2e \sin(cpt - \alpha) + \frac{1}{2}e^2 \sin 2(cpt - \alpha) \\ + \frac{1}{4}me \sin(2 - 2m - cpt - 2\beta + \alpha) \\ + \frac{1}{8}m^2 \sin(2 - 2mpt - 2\beta). \end{aligned}$$

6. Investigate the changes in the Moon's orbit which are indicated by the first three terms of this expression, and also by those terms in conjunction with the fourth.

What correction of the Moon's motion in her orbit is furnished by the last term?

7. Give Newton's investigation of the motion of the lunar apsides during a revolution of the Moon; and also of the variations in the apsidal motion which present themselves in different positions of the apse line with reference to the Sun.

8. Assuming the differential equation of the Moon's latitude, viz.,

$$\frac{d^2s}{d\theta^2} + s = \frac{\frac{Ps - S}{h^2 u^3} - \frac{T}{h^2 u^3} \frac{ds}{d\theta}}{1 + 2 \int \frac{T}{h^2 u^3} d\theta};$$

prove

$$s = k \sin(g\theta - \gamma) + \frac{3}{8}mk \sin(2 - 2m - g\theta - 2\beta + \gamma),$$

and show what conclusions may be drawn from this expression as to the motion of the plane of the Moon's orbit.

9. Give Newton's investigation of the effect of the Sun's disturbing force on the inclination of the Moon's orbit.

10. Calculate g to the third order.

PHYSICAL PROBLEMS.

MR. TOWNSEND.

1. Four material particles a, b, c, d , connected with a common point O by four inextensible cords OA, OB, OC, OD , repel each other with forces varying directly as their masses and mutual distances conjointly; show that, in their configuration of relative equilibrium,

$$BCDO : CDAO : DABO : ABCO = a : b : c : d,$$

each tetrad of letters representing the volume of the tetrahedron of which its constituents are the vertices.

2. If, in the case of three particles a, b, c , similarly connected with a fixed point O , and acting on each other precisely as in the preceding question, the three connecting cords OA, OB, OC be supposed to receive

three small angular displacements α, β, γ from their positions and in their plane of equilibrium; investigate the cubic determinant whose roots give the three periods of harmonic vibration of the system, under the action of the small unbalanced forces developed by displacement.

3. An ellipse being supposed to be the curve of free equilibrium of a uniform cord, under the joint action of two central forces of equal absolute intensity, one repulsive and the other attractive, emanating from its two foci; given all particulars, determine the law of each force, with the points of evanescence of tension of the cord.

4. An elliptic groove or tube being supposed to be a path of brachystochronous description, between every two of its points, for a material particle constrained to frictionless motion in it under the action of two forces circumstanced precisely as those of the preceding question; given all particulars, determine again the law of each force, with the points of evanescence of velocity of the particle.

5. A rigid body of any form, previously in unconstrained equilibrium in free space, being supposed set in motion by a single impulsive force, or by any number of such forces compounding a single resultant; show that, if the initial motion be a pure rotation, unaccompanied by any movement of translation, its axis will be principal for the body, and conversely.

6. A uniform bar, revolving round an axis perpendicular to its length and passing through its centre of gravity, strikes perpendicularly at its point of greatest percussion against a uniform sphere previously at rest; given all particulars, determine the ratio of the percussions on the opposite hypotheses, of the axis being fixed and the sphere free, and of the sphere being fixed and the axis free.

7. Unequal terminal lengths of a uniform flexible chain, coiled partially round a perfectly rough horizontal cylinder capable of free rotation round its axis of figure supposed fixed, hang vertically at opposite sides of the cylinder, and keep it in accelerated motion by the difference of their weights; given all initial particulars, determine the velocity of the lowest point of the chain (a) at the instant of exhaustion of its shorter length, (b) at that of its final separation from the cylinder.

8. The area, intercepted between a cardioid and the fixed circle employed in its ordinary mode of generation, being supposed to revolve, with the circle, round its axis of figure; show that the shell and solid, formed by filling both generated volumes with the same homogeneous matter, will exert, for the law of the inverse square of the distance, the same attraction at their single point of contact with each other.

9. A thin ellipsoidal shell of uniform density, bounded by similar and coaxial surfaces, and attracting according to the law of the inverse square of the distance, being supposed to hold in equilibrium a surrounding mass of homogeneous incompressible fluid, the elements of which exert no sensible attraction on each other; given all particulars, determine the pressure at any point of the fluid.

MR. PANTON.

10. Assuming

$$P = \mu u^2 \left(1 - \frac{2}{3} s^2\right) - \frac{m' u'^3}{u} \left\{ \frac{1}{2} + \frac{2}{3} \cos 2(\theta - \theta') \right\},$$

$$T = -\frac{2}{3} \frac{m'u'^3}{u} \sin 2(\theta - \theta'),$$

$$\theta' = m\theta + \beta + 2e' \sin(m\theta + \beta - \zeta);$$

calculate the most important term depending on e' in the moon's mean parallax.

11. Calculate, on the same assumption, the term of the third order whose argument is $(2-3m)\theta - 3\beta + \zeta$ in that part of the expression for u which arises from the central disturbing force alone.

12. Newton proves that the force in a moveable focal ellipse is

$$\frac{F^2}{r^2} + \frac{R(G^2 - F^2)}{r^3},$$

where R is the semi-latus rectum, and $\frac{G-F}{G}$ the ratio of the mean angular velocity of the orbit to that of the body.

Show that this leads to a solution of the differential equation of motion of the form

$$u = a \{1 + e \cos(c'\theta - \alpha)\},$$

and express e' in terms of the c and m of the lunar theory.

Moderatorships in Classics.

Examiners.

J. K. INGRAM, LL. D., Regius Professor of Greek.

ROBERT Y. TYRRELL, M. A., Professor of Latin.

HEWITT R. POOLE, M. A.

THOMAS K. ABBOTT, M. A.

JOHN P. MAHAFFY, M. A.

DR. INGRAM.

Translate the following passages, adding such short notes as you may think necessary:—

1. *Beginning*, Αὐτὰρ ὃ τάμνετο δοῦρα· θεῶς δὲ οἱ ἤνυστο ἔργον. κ. τ. λ.
Ending, μοχλοῖσιν δ' ἄρα τήνγχε κατεῖρυσεν εἰς ἄλλα διαν.
 HOMER, *Odyssey*, Book v. 241-261.
2. *Beginning*, εἰ δ' ἔὼν καλὸς ἔρδων τ' τοικόντα μορφή, κ. τ. λ.
Ending, κατίββα ποδι, μυριάν δ' ἀρετᾶν ἀτελεῖ νόψ γεύεται.
 PINDAR, *Nem.*, 3, 19-45.
3. *Beginning*, τὸ μὲν γυναιῖκα πρῶτον ἄρσενος δίχα, κ. τ. λ.
Ending, ὀρώσα πλείω τοῦ ξυνεύδοντος χυόνου.
 ÆSCHYLUS, *Agam.*, 834-849, 860-867.

4. *Beginning*, νῆα τὰδε νιόθιν ἤλθί μοι, κ. τ. λ.
Ending, σπιῦσον, αἴσος', ὦναξ.

SOPHOCLES, *Edip. Col.*

5. *Beginning*, ἐκ τῶν καλῶν κομποῦσι τοῖσι Θεσσαλοῖς, κ. τ. λ.
Ending, ἡσπαιριν, ἡλάλαζε δυσθνήσκων φόνψ.

EURIPIDES, *Electra*, 815-843.

6. *Beginning*, κᾶτα γίγνομαι παχὺς, κ. τ. λ.

Ending, ὦν ἔτ' εὐθύνας ἰμοὶ δώσουσιν, ἣν θεὸς θέλῃ.

ARISTOPHANES, *Pax*, 1170-1187.

MR. ABBOTT.

Translate the following passages into English:—

1. *Beginning*, Ὁ δὲ Νικίας ἐνόμιζε μὲν καὶ αὐτὸς, κ. τ. λ.
Ending, ἐκ τούτων αὐτοὺς πεισεσθαι.

THUCYDIDES, lib. vii. cap. 48.

2. *Beginning*, ΣΩ. Τῆς ξυμμίξεως τούτων πρὸς, κ. τ. λ.
Ending, καὶ αὐτῷ τετελευτήκατον.

PLATO, *Philebos*.

3. *Beginning*, Οὐκοῦν οἴσθα, ἣν δ' ἐγώ, κ. τ. λ.
Ending, παντὸς ἄλλου ῥύμματος.

Ibid., *De Republica*, lib. iv.

4. *Beginning*, Δῆλον ὅτι τὴν εἰδαιμονίαν, κ. τ. λ.
Ending, ἀγαθὰ ἴστι τὰ ἀπλῶς ἀγαθὰ.

ARISTOTLE, *Politicos*, lib. vii. cap. 12.

5. *Beginning*, Οὐ τοίνυν μόνον ἐξ ὧν, κ. τ. λ.
Ending, εἰ τις ἡδικεῖ με, ἐπὶ τοῦτον ᾗα.

DEMOSTHENES, *Orations*, 1106.

MR. TYRRELL.

Translate the following passages:—

1. *Beginning*, Omne quod est igitur nulla regione viarum....
Ending, Omne quidem vero nil est quod finiat extra.

LUCRETIVS, i. 958-987.

2. *Beginning*, To. Commisce mulsum ! struthea coluteaque appara,....
Ending, Qui familiarem suam vitam oblectet modo.

PLAUTUS, *Persa*, i. 3, 7-46.

3. *Beginning*, In septis Mamurra diu multumque vagatus,....
Ending, Asse duos calices emit, et ipse tulit.

MARTIAL, ix. 60.

4. *Beginning*, Haec, fato quae teste probet, quis iustius arma....
Ending, Curribus, unius gentes non esse triumphi.

LUCAN, *Phars.*, 259-280.

5. *Beginning*, Inter mille rates tua sit millesima puppis,
Ending, Ut solet adfuso surgere flamma mero.

OVID, *Her.*, xiii. 97-114.

CLASSICAL PROSE AUTHORS.

MR. POOLE.

Translate the following passages into English Prose :—

1. *Beginning*, Quo quidem tempore, quid populus Romanus....
Ending, aut non exprimeret ipse actor.
CICERO, *Pro P. Sestio*, c. 55.
2. *Beginning*, Unum te puto minus blandum esse, quam me :
Ending, Ne talis vir ἀλογηθῇ. Sed μελήσει.
Ibid., *Ep. ad Atticum*, lib. xii. ep. 3.
3. *Beginning*, Illud animorum corporumque dissimile,
Ending, dilucide dixerimus pro rerum obscuritate.
Ibid., *Tusc. Quaest.*, lib. iv. cap. 14.
4. *Beginning*, Eo anno Cn. Flavius Cn. filius scriba,
Ending, libertinorum filiis lectis inquinaverat.
LIVY, lib. ix. cap. 46.
5. *Beginning*, Civilis primores gentis et promptissimos vulgi....
Ending, et sustinentium humeris vibratus, dux deligitur.
TACITUS, *Hist.*, lib. iv. cap. 14.
6. *Beginning*, Errat, si quis existimat facilem rem esse donare....
Ending, ut dictis facta respondeant.
SENECA, *De Vita Beata*, cap. 24.

DR. INGRAM.

Translate the following passage into Greek prose :—

Of all nations in the world, where polygamy was not allowed, the Greeks seem to have been the most reserved in their commerce with the fair sex, and to have imposed on them the strictest laws of modesty and decency. We have a striking instance of this in an oration of Lysias. A widow injured, ruined, undone, calls a meeting of a few of her nearest friends and relations; and, though never before accustomed, says the orator, to speak in the presence of men, the distress of her circumstances constrained her to lay the case before them. The very opening of her mouth in such company required, it seems, an apology.

When Demosthenes prosecuted his tutors, to make them refund his patrimony, it became necessary for him, in the course of the law-suit, to prove that the marriage of Aphobus's sister with Onetor was entirely fraudulent, and that, notwithstanding her sham marriage, she had lived with her brother at Athens for two years past, ever since her divorce from her former husband. And it is remarkable, that though these were people of the first fortune and distinction in the city, the orator could

prove this fact no way, but by calling for her female slaves to be put to the question, and by the evidence of one physician, who had seen her in her brother's house during her illness. So reserved were Greek manners.

We may be assured, that an extreme purity of manners was the consequence of this reserve. Accordingly, we find, that, except the fabulous stories of an Helen and a Clytemnestra, there scarcely is an instance of any event in the Greek history, which proceeded from the intrigues of women. On the other hand, in modern times, particularly in a neighbouring nation, the females enter into all transactions and all management of church and state: And no man can expect success, who takes not care to obtain their good graces.—HUME.

MR. TYRRELL.

GREEK VERSE.

What if this cursed hand
Were thicker than itself with brother's blood?
Is there not rain enough in the sweet heav'n's
To wash it white as snow? whereto serves mercy,
But to confront the visage of offence?
And what's in prayer, but this twofold force,
To be forestalled ere we come to fall,
Or pardon'd being down? Then I'll look up;
My fault is past. But oh, what form of prayer
Can serve my turn? Forgive me my foul murder!
That cannot be, since I am still possess'd
Of those effects for which I did the murder,
My crown, mine own ambition, and my Queen.
May one be pardon'd, and retain th' offence?
In the corrupted currents of this world,
Offence's gilded hand may shove by justice;
And oft 'tis seen, the wicked prize itself
Buys out the laws. But 'tis not so above.
There is no shuffling; there the action lies
In his true nature, and we ourselves compell'd,
Ev'n to the teeth and forehead of our faults,
To give in evidence. What then? what rests?
Try what repentance can; what can it not?
Yet what can it, when one cannot repent?
Oh wretched state! oh bosom black as death!
Oh limed soul, that, struggling to be free,
Art more engag'd! Help, angels! make assay!
Bow, stubborn knees; and, heart, with strings of steel
Be soft as sinews of the new-born babe!
All may be well.

LATIN VERSE.

He is gone on the mountain,
He is lost to the forest,
Like a summer-dried fountain,
When our need was the sorest.

The fount reappearing
 From the raindrops shall borrow,
 But to us comes no cheering,
 To Duncan no morrow!

The hand of the reaper
 Takes the ears that are hoary;
 But the voice of the weeper
 Wails manhood in glory.
 The autumn winds rushing
 Waft the leaves that are serest,
 But our flower was in flushing
 When blighting was nearest.

Fleet foot on the correi,
 Sage counsel in cumber,
 Red hand in the foray,
 How sound is thy slumber!
 Like the dew on the mountain,
 Like the foam on the river,
 Like the bubble on the fountain,
 Thou art gone, and for ever!

MR. POOLE.

Translate the following passage into Latin Prose :—

An anxious regard to his personal safety was the ruling principle of the administration of Valens. In the condition of a subject, he had kissed, with trembling awe, the hand of the oppressor; and when he ascended the throne, he reasonably expected that the same fears which had subdued his own mind would secure the patient submission of his people. The favourites of Valens obtained, by the privilege of rapine and confiscation, the wealth which his economy would have refused. They urged, with persuasive eloquence, that, in all cases of treason, suspicion is equivalent to proof; that the power supposes the intention of mischief; that the intention is not less criminal than the act; and that a subject no longer deserves to live if his life may threaten the safety, or disturb the repose of his sovereign. The judgment of Valentinian was sometimes deceived, and his confidence abused; but he would have silenced the informers with a contemptuous smile had they presumed to alarm his fortitude by the sound of danger. They praised his inflexible love of justice; and, in the pursuit of justice, the emperor was easily tempted to consider clemency as a weakness, and passion as a virtue. As long as he wrestled with his equals, in the bold competition of an active and ambitious life, Valentinian was seldom injured, and never insulted, with impunity; if his prudence was arraigned, his spirit was applauded, and the proudest and most powerful generals were apprehensive of provoking the resentment of a fearless soldier. After he became master of the world, he unfortunately forgot, that where no resistance can be made, no courage can be exerted; and, instead of consulting the dictates of reason and magnanimity, he indulged the furious emotions of his tem-

per at a time when they were disgraceful to himself, and fatal to the defenceless objects of his displeasure. In the government of his household or of his empire, slight or even imaginary offences, a hasty word, a casual omission, an involuntary delay, were chastised by a sentence of immediate death.

MR. ABBOTT.

Discuss the following subjects :—

1. The public policy and career of Demosthenes.
2. The causes of the decline of public spirit at Athens.
3. The influence of Hellenism and of Orientalism on religion in Rome.
4. The native elements in Roman literature.
5. The attempted revolution of the Gracchi.

COMPARATIVE PHILOLOGY.

DR. INGRAM.

1. The original identity of *a*, *ε*, *o* can be made clear without the aid of Sanscrit?
2. What was the pronunciation of the Greek *v* in the earliest and in later times? How do the modern Greeks pronounce it?
3. What was most commonly the origin of ζ?
4. How is initial I. E. *gh* regularly represented in Latin? Give examples.
5. Give cases in which the several I. E. spirants are represented in Greek by the *spiritus asper*.
6. What are we to say as to the double forms *τόσος* and *τόσσοις*, *ποσί* and *ποσσι*, *ἴσομαι* and *ἴσσομαι*?
7. How may we explain the double consonants in *ἀρρηκτος*, *περίρρυτος*, *φιλομμειδής*? What are we to say of the Homeric forms *ἔμμαθε*, *ἔλλαβε*?
8. Explain the formation of the words *ἀληθεια*, *λῆαινα*, *τράπεζα*, *φαεινός*, *ἑᾶνός*, *πίπτω*, *ὀλλυμι*?
9. What different accounts have been given of such participles as *fessus*?
10. How does Curtius explain the forms *αἰδῖος*, *ῥηίδιος*? The word *ἰδῖος* may be similarly explained?
11. What Latin words correspond etymologically to the following Greek ones: *δασύς*, *ἰκυρός*, *θερμός*, *οὐθαρ*, *παχύς*, *ἕκνος*, *χάλαζα*?
12. What Greek words correspond etymologically with the following Latin ones: *anguis*, *cella*, *fendo*, *funda*, *holus*, *nurus*, *studeo*, *vereor*?
13. What Greek or Latin words correspond etymologically to the English *beech*, *deer*, *hemp*, *quean*, *quick*, *wit*?

14. What appear to be the meanings of the proper names 'Εφύρα, Κυρουργία, Μεσσήπιοι?

15. What derivations have been proposed for the following words: *cena, finis, hederæ, præda, bimus, invitus, invito*?

16. With what Greek termination does the Latin *-osus* seem to be radically identical?

17. What is *ππειγευράνς*, found in Cretan inscriptions? What I. E. language gives this termination (*-ns*) in its most complete form?

18. Why is it right to classify noun-stems according to the final letter, and wrong to classify verb-stems on the same principle?

19. To which of the classes of verbs in *ω* recognised by Curtius does each of the following belong: *καίω, κορύσσω, κράζω, φαίνω, φοισσω, ὠθίω*?

20. Some (as Ahrens) would include Curtius' T-class as a subdivision in another of his classes; on what grounds?

21. There are some traces of an O-conjugation in Latin?

22. Show the identity of the forms *ιπεπήγεα* and *pepigeram*.

23. Explain the remark that "the position of the Greek augment between the preposition and the verb has a deep foundation in the structure of the language."

24. Distinguish between determinative, attributive, and objective compounds.

Moderatorships in Mental and Moral Science.

Examiners.

JAMES MAC IVOR, D. D., Professor of Moral Philosophy.

JOHN W. STURRS, D. D.

GEORGE F. SHAW, LL. D.

FRANCIS A. TARLETON, LL. D.

THE PROFESSOR.

I. Cognition.

A.—Three sources of "knowledge," according to Locke?

1. What sort of knowledge do we derive from the *first*?

2. Bring it under his formal *definition* of knowledge.

3. Does he acknowledge this use of the word "idea"? Where?

4. Hume's *Scepticism*, therefore, as based on Locke, fails in its first proposition; viz., "But this universal and necessary opinion of all men is soon destroyed by the slightest philosophy which teaches that nothing can ever be present to the mind but an image or perception."?

5. And Hume's *Dogmatism*—that is, the system of positive knowledge which he indicates, but did not construct—emphasizes this first Lockian source of knowledge?

6. Both negatively and positively it is overlooked by Kant?

B.—Locke's *second* source of knowledge—"knowledge proper"—is also with him an independent source of "ideas." Enumerate these kinds?

1. According to Locke, no Kantian can have any "knowledge"?

2. Distinguish carefully between the Lockian and Kantian "Intuition"?

3. The Kantian doctrine of Mathematics, therefore, breaks down in *limine*?

4. As would any kind of "Demonstration," or even the understanding of any Abstract Proposition or Relation?

5. He makes some endeavour to explain away Relation; his analysis of "judgment"?

6. The Categories themselves are unintelligible and unperceivable on the Kantian system?

7. To supply this omission or negation in Kant would destroy his system?

8. What part of Hume's system did Kant intend the Categories to replace?

9. Supposing Hume's reasoning on Causation to be valid, it would still leave the Lockian *System* almost unimpaired?

10. Locke's and Hume's answer to Kant's question "How are synthetic judgments *a priori* possible"?

11. The development of modern science has vastly strengthened this part of the Lockian system?

C. What corresponds in Kant to Locke's *third* source of knowledge?

1. How many Lockian "faculties" does it (a) *include*, and (b) *involve*?

2. Compare it with the leading faculty in Hegel?

D.—Define "object," or "object of thought" on the Kantian system?

1. What Lockian entity most nearly corresponds to it?

2. On the ordinary meaning of "external" there can be no external objects to a Kantian. *We* are not objects to each other, for example?

3. Specially no Noumenon is an object?

4. Nor has the Practical Reason real objects; the moral procedure is ignorant and blind?

5. He acknowledges his principle of objectivity to be *opposite* to that of the whole antecedent world?

6. His own illustration of his originality inverts the fact? Dr. Webb's apology for it?

7. On what conditions only can and does he allow Freedom to God?

8. In respect to all the *three* classes of entities commonly recognised—the sensible, the intelligible, and those beyond the intellect—Kant is not merely a *transcendental*, but a *subjective* Idealist?

II. Action.

1. Nature's Universal Imperative?
2. Put it in the form suggested by Butler's Analogy?
3. Its limits?
4. Kant's "Imperative" therefore violates it *in limine*?
5. Hegel's correction, though a vast improvement, also violates it profoundly?
6. The error of both proceeds on the same false assumption as to the nature of the Mind or *Ego*?
7. And furnishes a practical illustration of Kant's doctrine of Objectivity?
8. The true principle of conciliation, or unity, between the Finite and the Infinite—in cognition and in action?
9. What truth is there in the Hegelian principle that "the finite" as such is essentially "false," and the "imperfect" "bad"?
10. Compare it with The Stoic Paradoxes?
11. The Scoto-Oxonian quasi-conciliation, *at best*, melts into nihilism?
12. On what condition can the "partial" be justly called "true," and the young or "imperfect" "good"?
13. Show this to be the *prime* dictate of Nature, Society, and Religion?

[Whatever time the candidates have to spare, after replying to the other questions, may be spent in illustrating this one.]

DR. STUBBS.

ETHICS.

1. Threefold division of the desires according to Epicurus? On what grounds does Cicero object to this division?
2. What two desires did the Epicureans reduce to the desire of safety? (Butler.)
3. Why did the Stoics add Logic to the Virtues?
4. How is wisdom defined by Torquatus? In order to show that it is not sought on its own account he compares it to two other arts?
5. Why does Cicero object to the argument of Epicurus, that pleasure is the *summum bonum* derived from the case of brutes and infants?
6. The ancient Peripatetics divided the whole of Philosophy into three parts; whence did they take this division?

7. St. Paul's well-known illustration drawn from the relation of the body and its members occurred to the mind of Cicero in a different form.

8. Mackintosh notices three important Ethical theories which were suggested by Lord Shaftesbury.

9. How does Mackintosh explain the supremacy of conscience? And how does he account for the immutability of moral feelings?

10. Clarke sometimes gave expression to opinions which are at variance with his system, and which showed that it was incomplete.

11. Butler cites three Ethical theories in order to show the danger of over great refinements in morals and religion.

12. What is the legitimate inquiry as to human passions which appear at first sight to be irreconcilable with the goodness of the Creator? How does Butler conduct this inquiry in the case of Resentment?

13. Butler contrasts the conduct of a man and a brute in obeying the inclination which appears to be the strongest.

14. He mentions several proofs of the obligations of religion which are not affected by the doctrine of necessity.

15. Give in full Butler's reply to the objection to Christianity from the abuse of miraculous gifts by some persons in the Apostolic age.

16. What instances does he adduce to show that virtuous actions, *as such*, are rewarded, and vicious actions punished, *as such*, even in the present world? There are two particular instances in domestic and in civil government which go to prove that a strictly moral government is already begun.

MANSEL.

1. How does Mansel explain the *necessity* of the matter of mathematical judgments?

2. What are the two *forms* of a syllogism? And what is the question the answer to which determines them?

3. In what way does Mansel modify the definitions of Logic given by Kant and by Sir William Hamilton?

4. Show that affirmative and negative induction may be both reduced to identity and contradiction.

5. The laws of thought may be psychologically distinguished from the other elements of the logical process by the answers to three questions.

6. Mansel remarks that the province of Logic has been by some writers too much narrowed and by others too much widened. Neither view has been consistently carried out? To what does he trace this error of logical writers?

7. What consideration is in Mansel's opinion sufficient to explain the failure of all attempts to demonstrate *a priori* the being and attributes of God?

8. Give some account of the rival theories of Schelling and Hegel, and Sir W. Hamilton's criticism of the former.

MILL'S UTILITARIANISM.—ARISTOTLE'S ETHICS.—MILL ON HAMILTON.—
SCHWEGLER.

D R. S H A W.

1. Give Mill's statement of the points of agreement and of disagreement between the instinctive and the inductive schools of morality.

2. Briefly indicate the replies that may be made to the following objections to the Utilitarian theory:—

(a.) To suppose that life has no higher end than pleasure is "mean and grovelling"; a doctrine worthy only of swine.

(b.) Experience proves that men often deliberately, and with full knowledge, postpone the higher to the lower pleasures of which they are capable.

(c.) It is irrational to make happiness in this world the end at which we aim, for this end is unattainable.

(d.) It is exacting too much to require that people shall always act from the inducement of promoting the general interests of society.

(e.) Utilitarianism chills the moral feelings by making us regard only the consequences of actions, instead of also taking into account the personal qualities from which those actions emanate.

3. Give Mill's account of the binding force of conscience. Show also that this question of "obligation" is independent of the view which is taken of the origin of the moral sentiment.

4. What is the characteristic element which distinguishes the obligation of justice from moral obligation in general? And what are the elements from which our sentiment of justice derives its peculiar energy?

5. Describe briefly the method by which Aristotle investigates the nature of *εὐδαιμοσία*, and compare the definition he finally arrives at with the account of happiness given respectively by Spinoza, Mill, and Butler.

6 and 7. (a.) "Ἐκ τε γὰρ τοῦ ἀπέχεσθαι τῶν ἡδονῶν γινόμεθα σώφρονες, καὶ γινόμενοι μάλιστα δυνάμεθα ἀπέχεσθαι αὐτῶν.

(b.) 'Ἐκ τῶν αὐτῶν καὶ διὰ τῶν αὐτῶν καὶ γίνεται πᾶσα ἀρετὴ καὶ φθίρεται.

(c.) Εὐλογον δὲ τοῖς εἰδοσι τῶν ζητούντων ἡδίω τὴν διαγωγὴν εἶναι.

Compare the above passages with the statements of Bishop Butler on the same subjects.

8. Enumerate the *ἀπορίαι* raised in B. VII. respecting *ἀκράτεια* and *ἡκράτεια*.

9. "The question" says Schwegler, "in what relation the two worlds of Sense and of the Ideas stand to each other, Plato has answered neither satisfactorily nor in agreement with himself." Cite the substance of some of the passages from Plato's works by which this criticism is made good.

10. How does Aristotle employ the relation of *δύναμις* to *ἐνέργεια* to determine the Idea of the Supreme or "Absolute" Being?

11. Give Mill's explanation of the fact that one group of possibilities of sensation can be conceived as destroying or modifying another group.

12. In Hamilton's polemic against Cousin, regarding the possibility of our cognition of the Absolute, one of Sir William's arguments turns on the fact that all human knowledge involves the perception of plurality and difference. Another, on the fact that Cousin's Absolute is an absolute cause, and that an absolute cause is a contradiction in terms. Give Mill's replies to both arguments.

DR. TARLETON.

1. How does Kant deduce the categories analytically, starting from the nature of experience and its objects; synthetically, starting from the supreme condition of all knowledge.

One of these methods of transcendental deduction is similar in its character to the transcendental exposition of space.

2. How is Cartesian idealism refuted by Kant?

Show from the meaning of the word transcendental, that it describes exactly the character of Kant's idealism.

3. If the fourth antinomy be slightly modified, it seems possible to show the correspondence of each of the twelve categories to an idea of the reason. Develop this correspondence.

4. Describe Kant's theory of the intelligible and empirical characters, and show how the same action can be regarded as free and as necessary.

5. What are the antinomies of the pure reason, and how are they solved by Kant in his *Prolegomena*?

6. What erroneous opinion in reference to the meaning of the copula is frequently held, according to Mill?

It would seem possible, on Kant's principles to distinguish the class of affirmative propositions, in reference to which this opinion is not wholly incorrect from that in reference to which it is.

Hobbes' special error with regard to the nature of *negative* propositions as described by Mill seems to amount to a confusion between two kinds of propositions distinguished by Kant.

7. How does Mill show that a Natural Realist has no right to regard the principle of causality as *a priori*?

Mill's objection to the *a priori* origin of the principle has no validity in reference to Kant.

As described by Mill what is the exact character of the principle regarded as a hypothesis; as a law.

8. How do subalternation and conversion, according to Mill, differ from the syllogism in reference to their right to be considered processes of inference?

How does Mill endeavour to show that there is a *petitio principii* in every syllogism?

If it were stated that the universality of natural sequences which have been uniformly observed is inferred by means of a syllogism whose major premiss consists of the statement "Sequences which have been uniformly observed exist in similar cases which have not been observed," what objection could be made by Mill?

9. On what grounds does Mill affirm that the methods of physiology, mental philosophy, and the social science must be principally deductive?

Why is chemistry not a deductive science?

Some of the most important mental phenomena exhibit characteristics unsuited for either the experimental or the deductive method of investigation.

10. How are fallacies of observation classified by Mill, and what are the principal causes which lead to them?

How does Mill show that a general proposition, collected from particulars may be more certainly true than any of the particular propositions from which it was inferred?

1. How does Kant arrive at the supreme principle of Morality from the analysis of a morally good action?

The actions enjoined by the Moral Law form two classes?

Show how Kant's formula applies in the case of an action belonging to each class.

2. Show how the categorical imperative of the Moral Law is possible, and that it must hold good for every rational being whose Reason is practical.

3. What is the Antinomy of the pure practical Reason?

How is it solved by Kant?

What result as to the nature of the *summum bonum* follows from this solution?

4. How does Kant define a Postulate of pure practical Reason? and show how it differs in its character from a Postulate in Mathematics.

How does he meet the statement that we cannot argue from a want to the objective reality of its object?

Though partly dependent on the subjective conditions of Reason, the Postulates are nevertheless valid?

5. Describe the mode in which, on Kant's principles, a bad action originates.

Moderatorships in Experimental Science.

Examiners.

J. H. JELLETT, B. D.

JOHN R. LESLIE, M. A., Professor of Experimental Philosophy.

JAMES APJOHN, M. D., Professor of Chemistry.

GEORGE L. CATHCART, M. A.

LIGHT AND SOUND.

MR. JELLETT.

1. Describe Foucault's method for measuring the velocity of light.

(a). The result so obtained differs from that obtained by means of the eclipses of Jupiter's satellites. Show that some difference might have been anticipated.

(b). Which of these results ought theoretically to be used in determining the aberration of the fixed stars?

2. In using Fresnel's fringes of interference for the purpose of determining the length of a wave, explain how the distance between the virtual radiants is to be determined.

(a). Is the dispersion of the fringes produced by Pouillet's double prism greater or less than in those produced by the two mirrors? State the reason for your answer.

3. Show that the ordinary mathematical investigation of Fresnel's fringes is in strictness applicable only to light polarized in one particular plane.

(a). What in general is the nature of the light in fringes of interference, the incident light being plane polarized?

4. How did Malus prove experimentally that the extraordinary wave surface in an uniaxal crystal is an ellipsoid of revolution?

5. Describe the methods of determining the ellipse of vibration in an elliptically-polarized ray.

1. By Babinet's compensator.

2. By a doubly-refracting prism,

and state the objections to the second method.

(a). What conditions must be fulfilled in order that two plane-polarized rays may produce an elliptically-polarized ray?

6. Describe the construction of the Nicol and Foucault prisms respectively, and explain fully an advantage possessed by the latter.

(a). Does the Nicol prism possess any advantage over the Foucault prism?

7. Deduce the laws of the phenomenon of the interference of sounds of equal period from the theoretic formula, and describe an experiment by which these conclusions may be verified.

(a). Describe and explain the phenomenon observed, if the periods be unequal, distinguishing the cases of great and small inequality.

8. Describe Wertheim's method of calculating the error in the value of the velocity of sound caused by the errors in the position of the nodes of vibration in a tube filled with air.

MR. LESLIE.

1. State the method of making the different adjustments in a cathetometer, the methods of calibrating a tube, and the mode of graduating a glass tube or scale by means of a dividing engine.

2. Explain the various methods of finding the expansions of solids and liquids by heat, and state some of the results obtained.

3. Jamin gives the details of three experiments made by Regnault to find the expansion of gases, what are they, and how do the results differ?

4. Give the theory of the process given by Jamin for determining accurately the density of a gas.

How does the weight of a gas vary with the height and latitude of a place?

5. Give the theory of Dumas' method of finding the density of a vapour, and state the details of the experiment.

6. What is Gay-Lussac's method of obtaining the density of a vapour, and how is the experiment made?

7. Deduce the formula given by Jamin for the wet and dry bulb thermometers, and state the errors to which the result is liable.

8. Describe Melloni's apparatus for verifying the laws of radiant heat, mentioning the experiments for which the different parts of the apparatus are intended.

9. How was the law of cooling in a vacuum found experimentally? Show that Newton's law is only an approximation.

10. State accurately the methods of finding specific heats of solids and liquids by the method of mixtures, and by Bunsen's ice-calorimeter.

11. State the methods by which the mechanical equivalent of heat has been found, and show how Boyle and Dalton's laws are consequences of the mechanical theory.

12. How are the specific heats of gases connected with the mechanical equivalent of heat, and what is the method of arranging the experiment by which Clement and Desormes determined the ratio of the two specific heats?

MR. CATHCART.

1. Describe the electrostatic inductive machine of Holtz, and its mode of action.

2. How did Riess experiment on the heat produced by the discharge of Leyden batteries? At what results did he arrive in the cases of (a) complete discharge; (b) incomplete discharge; (c) cascade batteries?

3. What is the modern contact theory of the pile, and how does it differ from that of Volta? What are the principal experiments on which it rests?

4. Explain how electromotive force may be calculated in absolute units from a knowledge of the heats of combination of the products in a cell. Calculate it for Daniell's cell on the following data:

The heat evolved in the formation of sulphate of zinc is 1670 units per gramme of zinc; the heat evolved in the formation of sulphate of copper is 941 units per gramme of copper; electrochemical equivalent of zinc is .00342; $Zn = 65.2$ $Cu = 63.5$.

5. Find what must be the resistance of a shunt to reduce the current through a galvanometer to one n th part. What is the *multiplying power* of a shunt?

6. Give a full account of the *loop test*, illustrating by a diagram the connexions with the ordinary box of resistances.

7. In testing a submarine cable for a fault how is the variation of resistance of the fault eliminated?

8. Experiments have shown that the action of the earth in telegraphy is that of a reservoir, not of a return line?

9. Weber's expression (on double fluid hypothesis) for the potential of two electric molecules e, e'

$$V = -\frac{ee'}{r} \left(\frac{1}{c} \frac{dr}{dt^2} - 1 \right)$$

includes not only Coulomb's but Ampère's law.

10. Deduce from the expression $\frac{\mu i \sin \omega ds}{r^3}$ for the action of a solenoid pole on a current element its action on an indefinite angular current. Point out in what respects a hollow magnet and a solenoid resemble, and how they differ, in action.

11. What are the phenomena known as magnetism of rotation investigated by Arago? Faraday gave their true explanation?

12. How is Peltier's thermoelectric experiment made? What are *neutral points*?

13. What is the principle of Siemen's electrical resistance thermometer? What results have been obtained on the variation of resistance of metals with change of temperature?

14. What is the *passive state* of iron, and how is it taken advantage of? Are there any other analogous phenomena?

15. Sketch, in order, the principal improvements which have been made in magneto-electric machines.

MR. LESLIE.

1. The adjacent edges of a bar magnet are a and b , calculate by theory the moment of inertia round an axis passing through the centre of gravity, and parallel to the third edge.

(a). Calculate the moment of inertia of a cylindrical magnet referred to an axis perpendicular to the middle of the axis of the cylinder.

2. The time of vibration of a magnet being t , and when loaded with an additional weight consisting of two brass cylinders being t' , show how to find the moment of inertia.

(a). Calculate the moment of inertia in the following case:—

Weight of cylinder = 1786 grs.

Radius " = 0.025 ft.

Length " = 0.25 ft.

t = 12 secs.

t' = 22 secs.

Length of magnet = 1.003 ft.

(b). How is the radius of the cylinder found?

3. Show how to determine the direction and intensity of the force of a magnet on a magnetic element, and give a geometrical construction for the direction of the force when the distance of the point acted on is considerable in comparison with the length of the magnet.

4. The lengths of two magnets lying in the same horizontal plane being small compared with their distance apart, show how to find the directive force of the first upon the second.

(a). If the magnetic axes are at right angles, find the angle made by the line joining the centres of the magnets with the axis of the first so that the second magnet may be unaffected by the first.

5. State the method of making the adjustments required in a magnetic theodolite.

Show how the position of the magnet is affected by the torsion of the suspending thread, and determine the deviation of the plane of detorsion.

6. Show how the bifilar magnetometer may be used in those measures of absolute force which are usually obtained by experiments of vibration, and state the experimental difficulties in the process.

(a). Explain the method of using the bifilar to find the variations of the earth's horizontal magnetic force.

(b). How is the bifilar magnet to be brought into the position perpendicular to the magnetic meridian?

7. What is the principle of the balance magnetometer by which the variations in the vertical component of the earth's magnetic force are found?

(a). Show that the angle formed by the line joining the centre of gravity of the magnet with the centre of motion and the magnetic axis may be found by experiments of vibration.

8. To find the dip from the observed positions of a nearly balanced needle moving in the plane of the magnetic meridian, eight observations are necessary; what errors are obviated by taking their mean?

(a). Show why it is more accurate to determine the magnetic meridian by observing the position of the dip circle when the needle is vertical, than from observations in any other azimuth.

9. When a needle which is not nearly balanced moves in the plane of the magnetic meridian, show that the dip is given by the relation

$$\tan i = \frac{\cot \theta - \cot \theta' - (\cot \phi - \cot \phi')}{\cot \theta \cot \phi' - \cot \theta' \cot \phi}$$

θ and θ' being the inclinations observed before and after the reversal of the needle on its supports, and ϕ and ϕ' being the same quantities after the reversal of the poles of the needle.

DR. APJOHN.

ORGANIC CHEMISTRY.

[N. B.—All reactions must be explained in symbols.]

1. The number of atoms of carbon being n , write the empirical formula of the paraffin, the olefine, the primary monatomic alcohol, the aldehyd, and the fatty acid of the series.

2 d

2. Write the constitutional formulæ of the same compounds the value of n being 2.
3. Give a graphic representation of the isomers occurring in the paraffins C_4H_{10} , and C_5H_{12} .
4. How would you, by means of ethylide of zinc, prepare a paraffin, and convert this into an alcohol?
5. The ordinary formulæ of ferrocyanide of potassium, and ferridcyanide of potassium, represent only half molecules. How would you make in them the necessary corrections?
6. Write the constitutional formulæ of acetylene, and explain how it may be obtained by the saponification of the bromide of ethylan. Give also the composition of the precipitate which is formed when acetylene is passed into an ammoniacal solution of cuprous chloride.
7. In making the electrolysis of melted acetate of potassium, Kolbè obtained a paraffine, and in operating similarly on succinate of potassium he obtained an olefine. How are these results explained?
8. What products are obtained when nitrous acid is made to act on ethylamine and on aniline?
9. Explain the production of acetone from acetate of calcium, and the method of converting it into isopropyl alcohol. Write also the constitutional formulæ of the isomers—acetone, aldehyd, allylic alcohol.
10. How has the iodide of allyl been made, and by what reactions has it been converted into allylic alcohol?
11. What is the definition of a secondary alcohol, and how would you distinguish it from a primary?
12. Give the different processes for preparing urea synthetically, viz., that in which we employ carbonic ether, that in which we use phosgene gas, and that in which we use cyanate of potassium.
13. State the changes which occur to formiate of sodium, and formiate of ammonium, when each is exposed to a sufficient heat.
14. To what class of bodies is chloral referred? How is it prepared, and what is the action exerted upon it by an alcoholic solution of potash?
15. Write the empirical formula of lactic acid, the formula which indicates its atomicity and basicity, and lastly its constitutional formula. Explain also the methods by which it has been made artificially.
16. There are two isomeric cyanides of ethyl. Write the constitutional formula of each. State how each is made, and how they are distinguished from each other by the products which they yield when acted upon by potash.
17. Mention and explain the methods of preparing azo-benzine $(C_6H_5)_2N$, and the oxide of azo-benzine, $(C_6H_5)_2NO$, and write the constitutional formula of each of these compounds.
18. Give with the aid of Kekule's ring the constitutional formula of the hydrocarbon, C_8H_{12} , and demonstrate that it may have eight isomers.

19. By a careful analysis caffeine has been found to consist of

Carbon . . .	49.5
Hydrogen . . .	5.2
Nitrogen . . .	28.9
Oxygen . . .	16.4
	<hr/>
	100.

Its double salt too with platinic chloride leaves upon ignition 24.6 p. c. of metallic platinum. From these data determine its molecular formula.

20. Grape sugar upon analysis gives a formula which, reduced to its lowest terms, is CH_2O . The formula however is generally written $\text{C}_6\text{H}_{12}\text{O}_6$. How are we justified in concluding that this latter is the true formula?

MINERAL CHEMISTRY.

[N. B.—All reactions must be explained in symbols.]

1. If a grains of a mixture of the carbonates of barium and calcium yield b grains of CO_2 , what is the amount of each carbonate?

2. In a mixture of carbonate and hydrate of sodium how is the quantity of each estimated by a direct, and also by an indirect process.

3. Some alloys used in the arts include tin, lead, copper, iron, and zinc. Assuming all these metals to be present, how would you determine the amount of each?

4. Explain the action of permanganate of potassium on oxalic acid in the presence of sulphuric acid.

5. How, in the case of a mixed solution of lead, bismuth, silver, mercury, copper, cadmium, and zinc, would you estimate the amount of each?

6. Ordinary shot for fowling purposes, in addition to lead, includes arsenic. How is its analysis made?

7. Give an explanation of the reactions which occur in Gladstone and Tribe's process for the estimation of the nitrogen of nitrates, and of nitrites.

8. A well-known mineral, according to the analysis of Rose, consists of

Sulphur, . . .	20.31
Antimony, . . .	26.28
Lead, . . .	40.84
Copper, . . .	12.65
	<hr/>
	100.09

How was the analysis made, and what is the formula and what the name of the mineral?

9. Permanganate of potassium, either alone, or in association with other reagents, is used for various purposes in analysis, a few of which are the following:—

1. To estimate iron.
2. To estimate calcium or lead.
3. To assay the native oxides of manganese.
4. To estimate the degree of purity of ferrocyanide of potassium.

Explain the reactions which occur in each of these cases.

10. There are two exact methods of separating cobalt and nickel. Give an explanation of each.

11. The amount of sulphur in iron pyrites is usually determined by a method the first step of which is the fusion of the mineral with potassium nitrate. Mention the further experiments which require to be made, and give a full explanation of the process.

12. Iron pyrites generally contain a little copper and arsenic. How in such case is its analysis made?

13. The commercial cyanide of potassium is made by fusing a mixture of dry ferrocyanide, and dry carbonate of potassium. In what relative quantities should these salts be used, and what is the exact nature of the products.

14. Chloride of silver may be brought into solution by different reagents. Enumerate them, and explain the action of each.

15. Iodine is used in estimating cyanide of potassium. What is the reaction which is the basis of this process?

16. There are two volumetric methods of estimating hydrocyanic acid by means of a solution of nitrate of silver. Give an explanation of each.

17. Give the process for estimating arsenious acid by means of a solution of iodine.

18. Having a mixture of the chloride, bromide, and iodide of potassium, how would you determine the amount of each?

19. Having a solution in hydrochloric acid of a substance consisting of alumina, ferric oxide, lime, magnesia, phosphoric and arsenic acids; how may each be estimated?

20. Give a description and explanation of the process of Rose for analyzing a mixture of the sulphides of arsenic, antimony, and tin.

N. B. —In the first step of the analysis HKSO_3 is employed.

MINERALOGY.

1. Give the names and formulæ of the anhydrous carbonates occurring in the hexangular and orthorhombic systems, and mention that carbonate which is known to be dimorphous.

2. Write the formulæ of emerald, and that of oriental emerald, the crystalline system of each, and the names of the different varieties of both minerals.

3. What are the differences, as respects composition and crystalline form, between oriental ruby and spinal ruby, and how are the varieties of the latter mineral named?

4. A mineral when analysed was found to consist of

Silex	.	.	.	55.0
Alumina	.	.	.	23.5
Potash	.	.	.	21.5

100

Deduce its empirical formula, and convert this into the formula which distinguishes between the *uniting* and the *combined* oxygen of the mineral, and in which the coefficient of the aluminum includes the factor β .

5. Give the composition and crystalline system of each of the following minerals, viz. : calamine, willemite, libsthenite, euchroite.

6. The formula of a certain mineral is written by Dana $\text{S.O} \parallel \text{O}_2 \parallel (\frac{1}{2}\text{R} + \frac{1}{3}\text{Ae})$. Reduce this to the ordinary empirical formula, and give the name of the mineral.

7. Of uniaxal crystals some are said to be *positive*, and some *negative*. Give the meaning of these phrases, and write a list of minerals belonging to each group.

8. Name the minerals which constitute the felspar group, and show that only one of them is, in strictness, a unisilicate.

9. Give Ross's notation for each of the hemihedral forms occurring in the regular and hexangular systems.

10. In a figure of orthoclase given by Dana certain planes are exhibited to which he gives the following notation, viz. :

O. $\bar{1}1$. $2\bar{1}$. $\bar{1}3$. 1 . $2\bar{1}$.

What is Ross's notation for these planes?

Moderatorships in Natural Science.

Examiners.

THE PROVOST.

SAMUEL HAUGHTON, M. D., Professor of Geology.

BENJAMIN G. M'DOWEL, M. D., Professor of Anatomy.

E. P. WRIGHT, M. D., Professor of Botany.

ALEXANDER MACALISTER, M. B., Professor of Zoology.

PHYSICAL GEOGRAPHY AND METEOROLOGY.

THE PROVOST.

1. The figure of the Earth is determined by three independent methods:—

(a). Which are they?

(b). What are the three resulting values of the Compression?

2 d 2

2. (a). How is the mass of the Earth determined by the balance of torsion ?
- (b). What is the mean density thence obtained by Baily ?
3. Explain the nature and extent of the changes in the level of the land in the North of Europe.
4. What are the largest plateaus in Europe ? and what their respective heights ?
5. Describe the *general* direction of the Oceanic currents ; and explain its production.
6. What is the height of the *homogeneous atmosphere* ? and how is it calculated ?
7. What is the limit to the Earth's atmosphere due to rotation ?
8. What is the fallacy of the method of determining the decrement of temperature in the atmosphere by balloon ascents ?
9. What is the temperature of space beyond the influence of Terrestrial radiation, according to Herschel ? and how is it deduced ?
10. Explain Dove's law of the rotation of the wind.

PHYSIOLOGICAL ANATOMY.

DR. M'DOWEL.

1. Describe the microscopical characters of fibrillar connective tissue.
2. Mention all the structures which enter into the composition of the epidermis.
3. What mechanical explanation has been offered of the formation of the transverse striæ of voluntary muscles ?
4. How does the functional activity of a gland influence the character of the blood of its efferent veins ?
5. Describe the ciliary muscle of the eye, and explain its action.
6. The structure of the vitreous humor of the eye ?
7. Contrast medullated and non-medullated nerve fibres.
8. How is the existence of decussating fibres in the spinal cord inferred ?
9. The peculiarities of the hepatic circulation in the foetus ?
10. The structural anatomy of one of the larger lymphatic trunks ?

COMPARATIVE ANATOMY.

DR. MACALISTER.

1. Describe the development of the crystalline lens and vitreous humour in a mammalian eye.
2. Under what forms is the *allantois* met with in amphibious Reptiles, Birds, and Primates ?

3. Contrast the brain of a *Sauropsid* with that of an *Ornithodelph mammal*.
4. What are the chief modifications of the swimming bladder in fishes?
5. What is the nature of the *Organ of Bojanus* among *Mollusca*?
6. Give the chief varieties of the vertebral column met with among recent *Ganoid* fishes.
7. What are the most striking features in the osteology of the brain-case of an *Ophidian*?
8. Contrast the Appendicular skeleton of *Ichthyosaurus* with that of *Plesiosaurus* and *Chelydra*.
9. What is the relation of the bones of the pelvic girdle to the plastron among the *Chelonians*?
10. Describe the larynx and air passages of a common frog.

BOTANY.

DR. E. PERCEVAL WRIGHT.

1. Give examples of Spines; and state in the examples you may give what the spines are modifications of.
2. What is meant by the terms "paleæ" and "pappus"?
3. Describe the inflorescence in *Artocarpus*.
4. Give an example of an excrescent peduncle.
5. Give examples of Plants having monœcious, diœcious, polygamous, and neutral flowers.
6. Describe the corolla of the Vine and the perianth of *Eriophorum*.
7. Give a sketch of the stamens in *Salvia*.
8. State what you know about the laticiferous system in Plants.
9. Describe the reproduction of the *Lycopodiaceæ*.
10. Give a diagnosis of the Natural Family of the *Rosaceæ*.
11. Give some of the most remarkable examples of "Insular Plants."
12. What Natural Family represents in Australia the Cape Heaths?
13. Describe the peculiar protandrous arrangement in *Parnassia palustris*.
14. State the peculiarities of the stem structure of *Isoetes*.
15. What is remarkable about the prothallia of *Isoetes*, *Selaginella*, and the *Ophioglossæ*?
16. Name a *Marsileaceous* plant native to Ireland.
17. Give the British genera of *Gentianaceæ*.
18. What is the arrangement of the stamens in *Primulaceæ*?
19. Describe the parts of the flower in *Viola*.
20. Describe the Plant on the table, using the Schedule given.

ZOOLOGY.

DR. MACALISTER.

1. Give the distinguishing characters of the Nematode genera, *Trichina*, *Trichocephalus*, *Strongylus*, *Ascaris*, and *Oxyuris*.
2. Give the leading points of importance in the embryology of *Anidodon* (*Comatula*).
3. Contrast the development of *Lingula* and *Waldheimia*.
4. What is the structure of the shell in *Pinna Cypræa*, and *Lepas*?
5. Describe the cement gland in *Cirripedia*, and what are its homologues among the other crustaceans?
6. What are the principal modifications of the eye found among *Cephalopoda*?
7. What are the primary divisions of *Hymenoptera*?
8. Mention any remarkable facts with which you may be acquainted concerning the reproduction of *Aphides*.
9. What are the families included in the order Carnivora? and how are they distinguished?
10. What are the chief modifications of the vertebral column met with among Elasmobranch fishes?

PALÆONTOLOGY.

DR. HAUGHTON.

1. State all you know, fully, as to the light thrown by Palæontology on the relationship between Birds, Amphibians, and Reptiles.
2. Various methods of estimating Geological time have been proposed, some physical and some biological; state the principles involved in these methods, and give your estimate of their comparative value.
3. Give a list of the fossil Monotremes, Marsupials, and Edentates; stating localities and geological formation.
4. Give a list of Characteristic Upper Silurian fossils, both European and American.
5. Refer to their proper Geological and Zoological place the following fossils:—
 - (a). *Terebratula hastata*.
 - (b). *Dinotherium giganteum*.
 - (c). *Goniatites retrorsus*.
 - (d). *Dromatherium sylvestre*.
6. Refer to their proper Geological and Zoological place the following fossils:—
 - (a). *Nautilus Koninckii*.
 - (b). *Eryon Arctiformis*.
 - (c). *Clymenia Sedgwickii*.
 - (d). *Palæoniscus Freieslebeni*.

7. Give an account of the Geological succession of the Crustaceans; and draw any inferences you can from that succession as to their law of development in time.

8. Give a similar account of the Echinoderms.

[N. B.—In addition to the foregoing questions, the Candidates were practically examined on the identification of fossils.]

Moderatorships in History and Political Science.

Examiners.

ALEXANDER G. RICHEY, LL. D., Deputy Professor of Feudal and English Law.

JAMES W. BARLOW, M. A., Professor of Modern History.

EDWARD DOWDEN, M. A., Professor of English Literature.

ROBERT DONNELL, M. A., Professor of Political Economy.

MODERN HISTORY.

PROFESSOR BARLOW.

A.

1. During the prevalence of feudal principles, France should rather be accounted a collection of states, partially allied to each other, than a single monarchy. What are Hallam's reasons for holding this opinion?

2. Give some account of the Visconti of Lombardy.

3. Hallam says of Innocent III.—“In each of the three leading objects which Rome has pursued, it was the fortune of this Pontiff to conquer.” Write an explanatory note.

4. Write a short account of the progress of domestic or civil architecture in England.

5. On what grounds does Hallam assert that “there was so much in the conduct and circumstances of both parties (Royalist and Parliamentary) in the year 1642 to excite disapprobation and distrust that a wise and good man could hardly unite cordially with either of them”?

6. Give an account of the different schemes for the government of England discussed in the Convention after the flight of James II.

7. Bishops Hoadley and Atterbury distinguished themselves in the reign of George I. In what respects? Consider the expediency of their treatment by the Legislature.

8. Give Hallam's account of the Constitutional History of Ireland from 1689 till the reign of George II.

9. What account does Erskine May give of the political position of the House of Lords, and the causes of its strength and weakness, as a part of the Legislature?

10. What important controversy arose between the two Houses of Parliament in 1860, and how was it decided?

11. Describing the relations of the late Sir Robert Peel with his party, May observes that the events of 1829 were repeated in 1846. Give some account of these events.

12. What proceedings took place in Parliament in consequence of the Orsini Conspiracy, 1858?

B.

1. Relate the history of the great Mohammedan Schism.

2. Give some account of Zingis Khan, first Emperor of the Moguls and Tartars.

3. Give the history of the reign of Mahomet II. from the conquest of Constantinople till his death.

4. "In the revolution of the twelfth century, which gave a new existence and era to Rome, we may observe the real and important events that marked or confirmed her political independence"?

5. Sir James Stephen, in his Lecture on the character and influence of Charlemagne, briefly sums up the causes which were constantly working out the success of the conqueror?

6. What is his answer to the question—"Why the influence of the Privileged Orders of France, Noble and Sacerdotal, was ineffectual to prevent the usurpation by the monarchs of that kingdom of an absolute and unlimited power"?

7. "With the massacre of St. Bartholomew closes the first of the three periods of the wars of religion. France may be considered as having, henceforward, resolved itself into four encampments, sometimes warring, sometimes intriguing with each other, but each maintaining a separate policy, and aiming at distinct objects." Give some account of these.

8. On what grounds does Stephen consider that Colbert was entitled to the gratitude of the French nation?

9. Write short accounts of—(a) the Siege of Haarlem (1573); (b) the Battle of Mookheath (1574); (c) the Union of Utrecht (1579).

10. What was the Interim (1548), and how was it received by the different parties affected by it? What was the Leipsic Interim?

11. Give a sketch of the history of Sweden from the Treaty of Nystadt (1721) till the Treaty of Abo (1743).

12. What was the *Société Malisset*?

C.

1. Date of the election of the first Doge of Venice ?
2. In the proceedings against Jeanne Darc, Hallam "notes a circumstance exceedingly remarkable in the ecclesiastical history of France" ?
3. What precedents were there for the deposition of the Emperor Wenceslaus, A. D. 1400 ?
4. The great problem of legitimacy between Urban VI. and Clement VII. depends, according to Hallam, upon a delicate question in jurisprudence ?
5. In estimating the morality of the Middle Ages, Hallam notices one species of crime, in particular, "as more universal and characteristic than others" ?
6. A remarkable authority for the clergy's capacity of sitting in the House of Commons may be found in the reign of Richard II. ?
7. Earliest precedent on record for the punishment of bribery in elections ?
8. Hallam considers that Lord Clarendon, the author of the History of the Rebellion, was, in one talent, unrivalled by any writer ?
9. In the Parliament of 1680, a Bill to relieve Protestant Dissenters from the penalties of the 35th of Elizabeth passed both Houses. What became of it ?
10. What were the only limitations upon the exercise of the Royal prerogatives imposed on the Regent by the Regency Act, 1840 ?
11. What Parliament was commonly called "the unreported Parliament," and why ?
12. What year, according to Erskine May, was the culminating point of the protracted contest between the State and liberty of opinion ?
13. Who were the candidates at the Election for the county of Clare in 1828 ?
14. To whom did Swift refer in these lines—

"So to effect his monarch's ends,
 From hell a viceroy devil ascends." ?
15. Date of accession of the Emperor Heraclius ?
16. Gibbon transcribes an authentic memorial found in the closet of the Caliph of Spain, Abdalrahman III. ?
17. He relates an extraordinary anecdote concerning the Carmathian general, Abu Taher ?
18. Cause of the excommunication of Michael Palæologus by Arsenius, Patriarch of Constantinople ?
19. Gibbon says—"The first Palæologus had saved his empire by involving the kingdoms of the West in rebellion and blood ; and from these scenes of discord uprose a generation of iron men who assaulted and endangered the empire of his son." Explain this.
20. What was the band of *La Hauléca* ? (Joinville.)

21. According to Sir James Stephen, the barons of France, by their conduct in the Albigensian Crusades, became the suicidal destroyers of their own fortunes, powers, and independence. How so?

22. He considers that the life of St. Louis was scarcely less fertile in warning than in example. Three disastrous results from his policy?

23. "The assumption by the Parliaments (of France) of the right to an effectual veto on the Royal enactments, had a direct and a powerful tendency to render the popular power of the purse sterile of constitutional freedom"?

24. Who was the "Roi des Halles"?

25. Which of our British institutions supplies the closest analogy to the Parliament of Paris as originally established?

26. Date of the Battle of Lepanto?

27. What was "La Paix de Monsieur"?

28. What were the "Three Bishoprics"? How, and when, were they separated from the German Empire?

29. How was Frederick II. saved from utter ruin after his defeat at Kolin?

30. Pius VI. paid a visit to Vienna in 1782. What was the cause of this?

HISTORY.

PROFESSOR DOWDEN.

1. What explanations have been offered of the reluctance of Charlemagne to assume the imperial title?

2. "There was a vague notion that the English, like other kingdoms, must depend on the Empire." Illustrate this statement.

3. Give a sketch of the contents of Dante's "*De Monarchia*."

4. (a). What was the chief work of the Frankfort Assembly of 1848?

(b). What was the policy of the National Union (National-Verein), 1859, and of the Reform Union, 1862?

5. What points of distinction are noticed by Guizot between the laws of the Visigoths and other barbarous laws?

6. (a). Guizot describes the state of Royalty during the tenth and eleventh centuries?

(b). "In the twelfth century, with the reign of Louis le Gros, the aspect of things began to change."

7. By those who deny that the "Judicium Parium" in Magna Charta means Trial by Jury, two hypotheses are brought forward. On what ground is each of these rejected by Creasy?

8. (a). Bacon notes two things in the Statute against Vagabonds, 19 Hen. VII.?

(b). What circumstances led to the negotiations of marriage between King James of Scotland and the Lady Margaret, daughter of Henry VII.?

9. Describe the state of the English navy in 1685.

10. (a). In 1648, Hutchinson and four other members of Parliament entered a protest against the proceedings and votes of the House. On what occasion?

(b). When Charles I. was in Carisbrook Castle, after his escape from Hampton Court, he desired a personal treaty with the Parliament. The two Houses agreed on four propositions to be passed as Bills before they would come to a personal treaty?

I.

1. Give an account of the messages between the Houses of Parliament previous to the trial of the Earl of Orford, Lord Somers, and others, 1701.

2. In 1708 "two discoveries were made, very unlucky for Mr. Harley"?

3. Relate how the Earl of Warwick drove King Edward IV. out of England, and how the King escaped to the Duke of Burgundy, 1470.

4. What were the circumstances of Master Oliver's interview with the Lady of Burgundy, 1477? In what way did he secure Tournay for the King?

II.

Answer briefly the following questions:—

1. Guizot cites a rescript of Honorius and Theodosius the Younger addressed to the Prefect of Gaul, 418. In what respect is it remarkable?

2. What, according to Guizot, is the cause of the hatred which the people have felt towards feudal despotism as compared with their feeling towards theocratic and monarchical despotism?

3. "Hincmar, Archbishop of Rheims, may perhaps be considered as the representative of this idea" (Guizot). What idea?

4. Guizot points out the most remarkable characteristic in the construction of a citizen's house in the twelfth century?

5. Why was Italy the seat of the mediæval attempt at a democratical organization of society?

6. Who was the last native Cæsar of Rome?

7. "Here begins the connection of the old imperial seat with the rising German power; here first the Pontiff leads a political movement" (Bryce). What is referred to?

8. In the discussion of the question, "Was the coronation of Charles a surprise?" a letter of Alcuin is important?

9. A. D. 843 marks an epoch?

10. "I am Cæsar—I am Emperor." What Pope uttered these words? On what occasion?

11. For what is the reign of the first monarch of the Franconian line, Conrad II., remarkable?

12. With whom does the theory of the translation of the Empire appear to have originated?
13. What is the difference between a man *attainted* and *convicted*?
14. When was Wager of law entirely abolished?
15. Who, according to the Great Charter, was to execute the summons of the tenants-in-chief to the Great Council? Why is this important?
16. The Court of Star-chamber, Bacon says, consisteth of four kinds of persons, and discerneth principally of four kinds of causes?
17. "This is that treaty which the Flemings call *Intercursus magnus* . . . to give it a difference from the treaty which they call *Intercursus malus*." Explain.
18. How did Lestrangle's "Observer" differ from the "London Gazette"?
19. In 1685 what towns stood next in point of population to the Capital?
20. Commynes makes an erroneous statement regarding Louis XI.'s convoking of the three Estates at Tours?
21. After the defeat near Granson, the Duke of Burgundy lost some important allies? Who was the Duchess of Savoy?
22. Burnet mentions the numbers of the army and of the seamen in 1698?
23. Dr. Hutton, the King's physician, mentioned to Burnet two remarkable instances of William's equanimity?
24. The Corporation Bill, says Burnet, produced a contrary effect to what was intended (1689)?
25. Two passages in Queen Anne's first speech gave offence?

A. G. RICHEY, LL. D.

1. State briefly the object and result of the Quadruple Alliance of 1834, and the principles upon which the British interference in the affairs of Spain were assailed and defended.
2. Contrast the assistance given by England to the United Netherlands with that given by France to America during the War of the Revolution.
3. State the principles as to dominion in adjoining seas laid down in the case of the "*Anna*;" the Royal declaration of 1604; and the Act of the 9 Geo. II. cap. 35 (A. D. 1736).
4. State the classes into which public ministers are divided, and their respective characters.
5. State the facts and respective arguments relative to the case of the *Caroline*.
6. State the facts and respective arguments relative to the case of the *Trent*.
7. State the principles of International Law applicable to the late remonstrance addressed by the Spanish to the French Government,

8. Write a brief sketch of the origin and development of Testamentary power in the Roman Law.

POLITICAL ECONOMY.

PROFESSOR DONNELL.

1. Show how the rate of profit depends on the cost of labour.
 2. What are the functions of credit?
 3. Is a measure of value possible?
 4. Examine the arguments put forward during the Belfast Strike—
 - (A). On the part of the mill-workers:
That the fact of several mills continuing at work, with satisfactory profits, was proof that no reduction in wages was necessary.
 - (B). On behalf of the mill-owners:
 - (a). That the prices of linen having fallen, wages should undergo a proportionate reduction.
 - (b). That the falling off in profits should be recouped out of wages.
 5. Show that strikes and trades' unions are "a valuable part of the existing machinery of society."
 6. Sketch—
 - (a). An argument for an Australian statesman in favour of avowed protectionism.
 - (b). An argument for an Australian statesman in favour of Free Trade, limited by a tariff framed for revenue purposes merely.
 - (c). The reply of a pure Free Trader in opposition to both.
 7. Sketch the history of the rise and overthrow of the theory of the Balance of Trade.
 8. What does Adam Smith mean by Regulated and Joint Stock Companies? Give instances
 9. Give a *résumé* of Adam Smith's arguments on the question of an Established Church.
 10. What are the taxes on successions to property, real and personal, in this country? Test them by Adam Smith's four maxims of taxation.
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Moderatorships in Modern Literature.

Examiners.

THOMAS STACK, M. A.

EDWARD DOWDEN, M. A., Professor of English Literature.

ROBERT ATKINSON, LL. D., Professor of the Romance Languages.

JAMES W. BARLOW, M. A.

ARTHUR PALMER, M. A.

ENGLISH LANGUAGE.

PROFESSOR DOWDEN.

Æfter þisum wordum wearð gemót gehæfd, and Ecgfridus þær-on gessæt, and Þeodorus, þises íglandes ercebiscop, mid manegum oðrum geðungenum witum, and hī ealle ánmodlice þone eadigan Cuðberhtum to biscope gecuron. Þa sendon hī sona gewritu mid þam ærende to ðam eadigan were; ac hī ne mihton hine of his mynstre gebringan. Þa reow se cyning sylf Ecgfridus to ðam íglande, and Trumwine biscop, mid oðrum eawfæstum werum, and hī þone halgan swiðe halsodon, heora cneow bigdon, and mid tearum bædon, oððæt hī hine wepende of ðam westene atugon to ðam sinoðe samod mid him; and he þone hād be heora hæse underfeng, swa swa hit gefyrn ær gesæd wæs, þurh þæs cildes múð, and þæs mæran biscopes Boisiles, þe him mid soðre witegunge his lífes endebyrðnysse sæde.

On ðam ylcan geare wearð eac ofslegen Ecgfridus, se æðela cyning on his unsiðe, þaða he on Peohtum begánn to feohtenne to dyrstelice, ofer Drihtnes willan; and his cyfes-borena broðor siððan rixode, seðe for wisdomes wende to Scottum, þæt he ælðeodig on lāre geðuge. Þa wæs gefylled seo foresæde spræc, swa swa se halga wer sæde þam mædene be hire gebroðrum, ær he biscop wære. Hwæt þa, siððan se halga Cuðberhtus, Lindisfarnensiscere gelaðunge leod-biscop, mid ealre gecneordnysse his folces gymde, to geefenlæcunge þæra eadigra apostola, and hī mid singalum gebedum gescylde wið deofol, and mid halwendum myngungum to heofonan tihte; and he swa leofode swa swa he sylf lærde, and á his bodunga mid gebysnungum astealde. and eac mid wundrum wel geglengde, and mid soðre lufe symle geswette, and gemetegode mid micclum geðylde, and wæs swiðe estful on ælcere spræce. He nolde awendan his gewunelican bigleo-fan, ne his gewæða, þe he on westene hæfde, ac ða stiðnyssa his

stearcan bigleofan, betwux læwedum folce, on his life geheold. He wæs swiðe welig wædum and þearfum, and symle him sylfum swiðe hafenleas.

1. Hallam compares Spenser to Ariosto. Give the substance of the passage.

2. What is Hallam's criticism of the language of "Romeo and Juliet"? Consider its justice.

3. Bacon's "Instauratio Magna" is divided, according to its author's plan, into six parts?

4. What has Hallam to say on the authorship of the "Two Noble Kinsmen"? Can you add anything?

5. Hallam compares Milton to Dante. What is the substance of the passage? Add any points of comparison you think important.

6. Describe Johnson's critical *method*, taking as an example his criticism of "Paradise Lost." Johnson considers in regular succession a number of distinct points?

7. What is Johnson's criticism of Pope's "ruling passion" theory?

8. Give some account of Mandeville's "Fable of the Bees."

9. Was Dryden the founder of a new school of English poetry, in the opinion of Mr. Craik? What is your own opinion?

10. (a). What is Carlyle's apologue of the "Dead Sea Apes"?

(b). What is his criticism on "Fair day's work for fair day's wages"?

(c). How did Abbot Samson outwit the Bishop of Ely?

1. Setting aside external evidence, by what marks can we approximately determine the date of a play of Shakspeare?

2. Write some notes upon Shakspeare's use of prose, noting the cases in any way interesting or remarkable, in which he employs prose in preference to verse.

3. Mention the speaker of each of the following passages, and the occasion on which the words were spoken:—

(a). "How many ages hence
Shall this our lofty scene be acted over,
In states unborn, and accents yet unknown?"

(b). "Unaccommodated man is no more but such a poor, bare, forked animal as thou art."

(c). "Be these juggling fiends no more believed
That palter with us in a double sense."

(d). "I had rather be a kitten, and cry, Mew!
Than one of these same metre-ballad-mongers."

- (e). "Stark as you see
Thus smiling, as some fly had tickled slumber,
Not as Death's dart being laughed at."
- (f). "The best of this kind are but shadows; and the worst are
no worse if imagination amend them."
- (g). "O so light a foot
Will ne'er wear out the everlasting flint."
- (h). "For he was likely had he been put on
To have proved most royally; and for his passage
The soldier's music, and the rites of war
Speak loudly for him."
- (i). "Alas! why gnaw you so your nether lip?
Some bloody passion shakes your very frame.
These are portents."
- (j). "Lo! here it sits,—
Which Heaven shall guard; and put the world's whole strength
Into one giant arm, it shall not force
This lineal honour from me."

4. Comment on the following particulars in Shakspeare's plays:—

- (a). The purport of the secondary plot (Gloster and his sons) in
"King Lear."
- (b). The strange treatment of the character of Julius Cæsar in the
play of that name.
- (c). The knocking scene in "Macbeth."
- (d). The character of Falstaff in the historical plays, and his cha-
racter in the "Merry Wives."

5. Write notes on the following passages:—

- (a). "His mother was a witch, and one so strong
That could control the moon, make ebbs and flows,
And deal in her command without her power."
- (b). "They are coming to the play; I must be idle."
- (c). "But, alas! to make me
A fixed figure for the hand of scorn
To point his slow, unmoving finger at."—Rowe.

What is the reading of the folio?

- (d). "There is no more faith in thee than in a stewed prune; nor
no more truth in thee than in a drawn fox."
- (e). "Then was Jack Falstaff, now Sir John, a boy; and *page to*
Thomas Mowbray, Duke of Norfolk."
- (f). "Let the sky rain potatoes . . . and snow eringoes."
- How does this passage help to ascertain the date of the play?
- (g). "The thrice three Muses mourning for the death
Of learning, late deceased in beggary."
- (h). "With everything that pretty *bin.*"

- (i). "This avarice
Sticks deeper, grows with more pernicious root
Than *summer-seeming* lust."
- (j). "Tut, dun's the mouse, the constable's own word
If thou art Dun we'll draw thee from the mire
Of this sir-reverence love."
6. (a). Which are the only scenes *in-doors* of "As you Like it" ?
- (b). Where in Shakspeare is the nearest approach to the style of Euphuism ?
- (c). What passage in "The Tempest" resembles some lines in Golding's Ovid ?
- (d). In "Midsummer Night's Dream," ten successive lines rhyme together ?
- (e). Brabantio's last words to Othello afterwards recur to Othello, and stimulate his suspicions ?
- (f). How does Portia die ?
- (g). How does Shakspeare pronounce the names Stephano, Posthumus, Hecate, Balthazar ?
- (h). In what play of Shakspeare, in your opinion, is there the nearest approach to a character who is virtually a chorus ?
- (i). What is the supposed season of the year in Romeo and Juliet ?
- (j). The advice of Polonius to Laertes is a cento of quotations ?
7. (a). A parallel has been pointed out in an earlier prose writer for Dryden's triplet, beginning
"A fiery soul which working out its way."
- (b). Twelve lines in the character of Achitophel were added in the second edition of the poem.
- (c). "But wild ambition loves to slide, not stand,
And fortune's ice prefers to virtue's land."

What is the probable origin of this couplet ?

- (d). How does Dryden describe the government of the Commonwealth before Cromwell's protectorate ?
- (e). Who were meant by Barzillai, Nadab, Balaam, Adriel ?
8. (a). "Blest paper-credit !" What suggests Pope's eulogy of paper money ?
- (b). What is the paradox or inconsistency brought out by Pope in the character of Sidney, Earl of Godolphin ?
- (c). "Even in an ornament its place remark."

Complete the couplet.

- (d). "As long as *Atalantis* shall be read."

Explain.

- (e). "Hang o'er the *Box* and hover round the *Ring*."

Explain.

9. (a). By what transition does Cowper pass from the sofa to other subjects?

(b). Date of the Task?

(c). Who is the "gentle savage," celebrated in *The Task*, B. I.

(d). "Are there who purchase of the Doctor's ware?
Oh name it not in Gath!"

Explain.

ENGLISH LITERATURE.

MR. PALMER.

1. Describe the paintings on the wall of the temple of Venus, and the statue of Venus (*Knighte's Tale*).

2. Explain the following passages:—

(a). Ther nas no dore that he nolde heve of harre.

(b). His herbergh, and his mone, his lodemenage.

(c). Me mette.

(d). Sche hath the herte in hold
 Of Chaunteclere loken in every lith.

(e). Beaute ne sleighte, strengthe, ne hardynesse,
 Ne may with Venus holde champartye.

3. How does Spenser personify Occasion, Disdayne, Shamefastness?

4. Explain the italicised words:—

(a). Pure *castory*.

(b). A mighty *mazer* bowle.

(c). And unto each a bulwarke did *arret*.

(d). Breaded *tramels*.

(e). Scoffing at him that did her justly *wite*.

5. What characteristics would lead you to believe a poem alleged to be written by Milton to be genuine?

(a). If it were in octosyllabic verse.

(b). If it were in blank verse.

(c). If it were a sonnet.

6. (a). What part in the action of *Paradise Lost* is taken by Sin and Death?

(b). Exhibit your acquaintance with some of the portions of *Samson Agonistes* assigned to the Chorus.

7. Exhibit your acquaintance with the following:—

(a). The lines on Fame in *Lycidas*.

(b). Wordsworth's supplication for the control of Duty.

(c). Shelley's appeal for succour to the West Wind.

(d). Collins' personification of Melancholy.

(e). Keats' personification of Autumn.

8. (a). The tone of one sonnet by Shakspeare is ascetic ?

(b). A series of verses in Dryden's "St. Cecilia," 1687, assign power over the passions to several musical instruments ?

(c). What characteristic of the skylark and his song suggests a series of comparisons to Shelley.

(d). What characteristic of the skylark and his song suggests Wordsworth's poem beginning "Ethereal minstrel" ?

(e). *Now more than ever seems it rich to die,
To cease upon the midnight with no pain.*

When ?

(f). *I could lie down like a tired child,
And weep away this life of care
Which I have borne and yet must bear,
Till death like sleep might steal on me.*

Under what influences and presences of Nature ?

(g). Johnson said there is "perhaps some melancholy" in the mirth of L'Allegro. What lines give countenance to this criticism ?

(h). *The swans on sweet Saint Mary's Lake
Float double, swans and shadow.*

Do you know any anecdote connected with these mis-quoted lines ? Write them down correctly.

9. (a). Describe the statuesque group of Saturn and Thea as conceived by Keats.

(b). What is Shelley's picture of himself in Adonais ?

(c). How does Coleridge describe Life-in-death ?

(d). What objects did the prisoner view from his dungeon window in the Castle of Chillon ?

(e). Describe the Wanderer's mood on beholding, as a youth, sunrise from "some bold headland."

(f). Note in order the chief incidents in the deliverance of the hero of the poem "Maud" (Part i.) from his weakness and melancholy.

MR. STACK.

Subjects for English Composition.

[Candidates are required to discuss *two* of the following subjects.]

1. Write an essay on the distinctive character of Parliamentary Debate, as compared with other forms of oratory.

2. Give an account of the principal epochs in the History of Fiction ; and write a critique of one of Sir W. Scott's Novels.

3. Write a critique of Shakspeare's "Julius Cæsar."

MR. BARIOW.

Translate the following passages :—

- (a) “ Seigneur, ne vous caut esmaier,
 Car en notre compagne n'ont li couart mestier.
 Penst aucuns que il puist sa vië calengier.
 Tout sommes gentil homme, duc et conte et princier ;
 Si devomes tant faire, pener et exploitier
 C'on ne l'puist après nous, à nos oirs reprocier ;
 Que ci ne fera bien, puis ne devra mangier
 A la table le roi que nous avomes cier.
 Li brans de ceste espée ne se viut estancier
 De si que jou le voie en cervielle baignier.
 Hui mais voel la bataille et l'essor surhaucier ;
 Penst cescuns de bien faire ; le jeu voel commencer.”

(b) Et les brouettes, les chariots de briques, de uiles, de planches, de poutres, de madriers, comme tout cela roulait de bonne heure vers la ville, pour rebâtir les maisons et relever les toits enfoncés par les obus ! Comme les fouets claquaient et comme les marteaux retentissaient au loin dans la campagne ! De tous les côtés on voyait les charpentiers et les maçons autour des gloriottes. Le père Ulrich et ses trois garçons étaient déjà sur le toit du Panier-Fleuri, rasé par les boulets de la ville, en train d'affermir la charpente neuve ; on les entendait siffler et frapper en cadence. Ah ! oui, c'était un temps d'activité ; la paix revenait ! ce n'est pas alors qu'on redemandait la guerre, non, non ! chacun savait ce que vaut la tranquillité chez soi ; chacun ne demandait qu'à réparer autant que possible toutes ces misères ; on savait qu'un coup de scie ou de rabot vaut mieux qu'un coup de canon ; on savait ce qu'il en coûte de fatigues et de larmes, pour relever en dix ans ce que les bombes renversent en deux minutes.

(c) “ Divès, s'étant aperçu que son bois, couvert de neige et trempé par la pluie, donnait plus de fumée que de flamme, avait abrité la vieille tour d'un toit en planches. A cette occasion, le contrebandier racontait une singulière histoire :—Il prétendait avoir découvert, en posant les chevrons, au fond d'une fissure, une chouette blanche comme neige, aveugle et débile, pourvue en abondance de mulots et de chauves-souris. C'est pourquoi il l'avait appelée la grand'mère du pays, supposant que tous les oiseaux venaient l'entretenir à cause de son extrême vieillesse.”

- (d) “ Moi, chamailler, bon Dieu ! Suis-je un Roland, mon maître, Ou quelque Ferragus ? C'est fort mal me connaître.
 Quand je viens à songer, moi qui me suis si cher,
 Qu'il ne faut que deux doigts d'un misérable fer
 Dans le corps, pour vous mettre un humain dans la bière,
 Je suis scandalisé d'une étrange manière.
 ‘ Mais tu seras armé de pied en cap. ’ Tant pis :
 J'en serai moins léger à gagner le taillis ;
 Et, de plus, Il n'est point d'armure si bien jointe
 Où ne puisse glisser une vilaine pointe.
 ‘ Oh ! tu seras ainsi tenu pour un poltron ! ’
 Soit, pourvu que toujours je branle le menton.
 A table comptez-moi, si vous voulez, pour quatre,
 Mais comptez-moi pour rien s'il s'agit de se battre.”

(e) "Aga, Charlotte, je m'en vas te conter tout fin drait comme cela est venu ; car, comme dit l'autre, je les ai le premier avisés, avisés le premier je les ai. Enfin donc j'étais sur le bord de la mar, moi et le gros Lucas, et je nous amusions à batifoler avec des mottes de tarre que je nous jésquions à la tête ; car, comme tu sais bian, le gros Lucas aime à batifoler, et moi, par fouas, je batifole itou. En batifolant donc, pisque batifoler y a, j'ai aparçu de tout loin queuque chose qui grouillait dans gliau, et qui venait comme envars nous par secousse. Je voyais cela fixiblement, et pis tout d'un coup je voyais que je ne voyais plus rian. Eh ! Lucas, c'ai-je fait, je pense que vlà des hommes qui nageant là-bas Voire, ce m'a-t-il fait, t'as été au trépassement d'un chat, t'as la vue trouble. Veux-tu gager, c'ai-je fait, que je n'ai point la barlue, c'ai-je fait, et que se sont deux hommes, c'ai-je fait, qui nageant droit ici, c'ai-je fait ? Je le veux bian, ce m'a-t-il fait, et, pour te montrer, vlà argent sur jeu, ce m'a-t-il fait. Moi, je n'ai point été ni fou, ni étourdi ; j'ai bravement bouté à tarre quatre pièces tapées, et cinq sous en doubles, aussi hardiment que si j'avais avalé un varre de vin, car je sis hasardeux, moi, et je vas à la débandade. Je savais bian ce que je faisais pourtant. Queuque gniais ! Enfin donc, je n'avons pas plutôt eu gagé, que j'avons vu les deux hommes tout à plain, qui nous faisiant signe de les aller querir ; et moi de tirer auparavant les enjeux. Allons, Lucas, c'ai-je dit, tu vois bian qu'ils nous appelont ; allons vite à leu secours. Non, ce m'a-t-il dit, ils m'ont fait perdre. Oh ! donc, tanquia qu'a la parfin, pour le faire court, je l'ai tant sarmonné, que je nous sommes boutés dans une barque, et pis j'avons tant fait cahin caha, que je les avons tirés de gliau, et pis je les avons menés cheux nous auprès du feu, et pis ils se sant dépouillés tout nus pour se sécher, et pis il y-en est venu encore deux de la même bande, qui s'equiant sauvés tout seuls ; et pis Mathurine est arrivée là, a qui l'en a fait les doux yeux."

(f) "Le disner acheuvé, le comte, tenant le conseil du grand prieur pour suspect, qui avoit advanturé sa vie pour saulver la sienne, se transporte allégrement avecq le comte de Hornes en la maison du Ducq, et monte en une chambre haulte, où il avoit accoustumé de tenir conseil, Sur les quatre heures, Pierre Urbine, Ingéniaire fort expert desplia sur la table une peau de parchemin où il avoit traché la figure du chasteau que volloit faire ériger le Ducq en la ville d'Anvers, avecq le plant et assiette de la dite ville. Le Ducq fut quelque temps en leur compaignie et, après avoir ouy divers avis, se retira pour quelque indisposition qu'il faindoit luy estre survenue, laissant les comtes d'Égmont, Hornes et Mansfelt, don Frédéricque, le grand prieur et Julien Romero, Maistre de camp, en plaine dispute avec l'ingéniaire Pacheco, qui dura environ les sept heures."

FRENCH LITERATURE.

MR. BARLOW.

1. (a) Write an analysis of the *Chanson de Roland*.

(b) "Le désastre de Roncevaux, ainsi transfiguré et devenu plus triomphant qu'une victoire de ce côté des Pyrénées, repand d'autres lumières encore sur la formation des légendes poétiques ?"

2. Give some account of the works of Chrestien de Troyes.

3. Write a note on the following lines:—

“ La brebis s'est agenouillée,
 Qui a répondu comme coye :
 J'ay esté quatre fois plumée
 Cest anci ; point n'ay de monnoye ;
 Le buef et la vache se ploye,
 Là se complaignoit la jument,
 Mais on leur respont toutevoie :
 Sà, de l'argent, sà, de l'argent.”

4. On what grounds is the name of François Corbueil (Villon) memorable in the history of French literature ?

5. M. Geruzex, speaking of the “ poètes qui forment le cortège et la suite de Ronsard,” observes that “ cette école généreuse n'a pas été inutile aux progrès de la littérature et au développement de la langue.” In what respects ?

6. “ Regnier, avant Boileau, a trouvé le secret de frapper de ces vers qui deviennent proverbes en naissant, et qui sont comme des médailles dont le temps n'efface pas l'empreinte.” M. Geruzex gives some specimens of these ?

7. He gives also some happy expressions for which the French language is indebted to the Hôtel de Rambouillet. Why was the marquise de Rambouillet called “ Arthenice ” ?

8. Write a short critique on the *Polyeucte* of Corneille.

9. M. Geruzex refers to *le Bourgeois gentilhomme* as an instance of the rigid impartiality of Molière ?

10. Write a note on this assertion—“ Grâce à Bossuet, nous savons combien Fénelon, qui a toujours prêché la paix, avait de ressources pour la guerre.”

11. And on this—“ Jean de Meung, vivant dans l'opulence et la considération ; Philip le Bel menant à bout ses audacieuses entreprises, seraient des énigmes sans mot, l'un avec son poème, l'autre avec sa politique, si la pensée qui poussa l'Europe contre l'Asie eût conservé sa puissance.”

12. Compare the lives of J. J. Rousseau and Bernardin de Saint-Pierre.

FRENCH.

DR. ATKINSON.

Translate the following :—

On lit dans les contes de Nathaniel Hawthorne la description d'un jardin singulier où un botaniste toxicologue a réuni la flore des plantes vénéneuses. Ces plantes aux feuillages bizarrement découpés, d'un vert noir ou minéralement glauque, comme si le sulfate de cuivre les teignait, ont une beauté sinistre et formidable. On les sent dangereuses malgré leur charme ; elles ont dans leur attitude hautaine, provocante ou perfide, la conscience d'un pouvoir immense ou d'une séduction irrésistible. De leurs fleurs féroce-ment bariolées et tigrées, d'un pourpre semblable à du

sang figé ou d'un blanc chlorotique, s'exhalent des parfums âcres, pénétrants, vertigineux ; dans leurs calices empoisonnés la rosée se change en aqua-tofana, et il ne voltige autour d'elles que des cantharides cuirassées d'or vert, ou des mouches d'un bleu d'acier dont la piqure donne le charbon. L'euphorbe, l'aconit, la jusquiame, la cigüe, la belladone y mêlent leurs froids virus aux ardents poisons des tropiques et de l'Inde ; le mancenillier y montre ses petites pommes mortelles comme celles qui pendaient à l'arbre de science ; l'upa y distille son suc laiteux plus corrosif que l'eau forte. Au-dessus du jardin flotte une vapeur malsaine qui étourdit les oiseaux lorsqu'ils la traversent ; cependant la fille du docteur vit impunément dans ces miasmes méphitiques ; ses poumons aspirent sans danger cet air où tout autre qu'elle et son père boirait une mort certaine. Elle se fait des bouquets de ces fleurs, elle en pare ses cheveux, elle en parfume son sein, elle en mordille les pétales comme les jeunes filles font des roses. Saturée lentement de suc vénéneux, elle est devenue elle-même un poison vivant qui neutralise tous les toxiques. Sa beauté, comme celle des plantes de son jardin a quelque chose d'inquiétant, de fatal et de morbide ; ses cheveux d'un noir bleu tranchent sinistrement sur sa peau d'une pâleur mate et verdâtre, où éclate sa bouche qu'on dirait empourprée à quelque baie sanglante. Un sourire fou découvre ses dents enchâssées dans des gencives d'un rouge sombre, et ses yeux fixes fascinent comme ceux des serpents. On dirait une de ces Javanaises vampires d'amour, succubes diurnes, dont la passion tarit en quinze jours le sang, les moelles et l'âme d'un Européen. Elle est vierge cependant, la fille du docteur, et languit dans la solitude. L'amour essaye en vain de s'acclimater à cette atmosphère, hors de laquelle elle ne saurait vivre.

Translate the following passages into English, adding brief notes as to the authors of the lines, their context and meaning :—

(a). Il avait fait une façon d'églogue exhalant la suave odeur du sainfoin et de l'omelette au cerfeuil.

(b). Et la caille passait à tire-d'aile à travers les mailles de son filet.

(c). Il commençait à débrouiller l'écheveau sanglant de la révolution française.

(d). La baguette et l'aiguille en sautoir auraient composé des armoiries très-convenables à ce fidèle ami de Lamartine.

(e). On n'avait pas besoin des manivelles de vos télégraphes.

(f). Le chêne dans son nœud la [=la hache] retenait de force,
Et recouvrait le fer de son bourlet d'écorce.

(g). Hélas ! ces longs regrets des amours mensongères,
Ces ruines du temps qu'on trouve à chaque pas,
Ces sillons infinis de lueurs éphémères,
Qui peut se dire un homme et ne les connaît pas ?

(h). L'hirondelle rasant l'auge où le cygne boit.

(i). Trois ruches au midi sous leurs tuiles.

(j). O les fronts rétrécis par la foison de cheveux noirs !

(k). J'ai rêvé d'aigle et m'éveille pinson.

- (l). De l'escabeau vide au foyer,
Là, le pauvre s'empare,
Et le grand bahut de noyer
Pour lui n'est point avare.
- (m). Dont les chiffres romains, éponges par la pluie,
Ont coulé sur le fond que nul pinceau n'essuie.
- (n). Fouettant votre dos bleu comme un fléau bat l'aire.
- (o). Et les pavots devraient jalouser les cyprés.
- (p). Murmurante oseraie
Où le ramier s'effraie.
- (q). Ces pensées sont persillées même de dépravation.
- (r). Mon coeur, comme un tambour voilé,
Va battant des marches funèbres.
- (s). On n'a que faire d'avoir peur de trop charger la complaisance.
- (t). Nous feignons à vous aborder, de peur de vous interrompre.
- (u). À ne les placer qu'au denier douze.
(What percentages are signified by denier dix-huit, denier cinq, denier quatre?)
- (v). Les vieux rogatons qu'il ramasse.
- (w). On pourrait crever qu'il ne branlerait pas.
- (x). Je n'ai pas les inclinations fort patibulaires, et je sais me démêler prudemment de toutes les galanteries qui sentent tant soit peu l'échelle.
- (y). Plus, un fourneau de brique, avec deux cornues et trois recipients ; plus, un trou-madame et un damier, avec un jeu de l'oie.
- (z). Ces beaux godelureaux, avec leur ton de poule laitée, leurs trois petits brins de barbe relevés en barbe de chat, leurs perruques d'étoupes, leurs hauts-de-chausses tombants, et leurs estomacs débraillés.

1. Give the origin and history of the following words :—bergeronnette : dessiller : bouvreuil : niais : muer (Voltaire) : cadeau : joue : cervoise : cacher : bélier : belet : e : aigrette : aîné : hangar : hagard : alouette.

2. (a) Write an essay on the sources of the French language.
- (b) How do you account for the fact that, though the race is Celtic, the language has preserved but few Celtic vocables? Give as many as you can of the Celtic words still extant in Mod. F.
- (c) What is the point of the following remark of M. Brachet : 'il y a moins loin de *scabinus* à *échevin*, que d' *échevin* à *skepeno*.'
- (d) Discuss the question whether French is derived from popular or from classic Latin.
3. (a) What is precisely the position of French among the Romance languages?
- (b) Compare its vocabulary with those of the other branches.
- (c) Compare also the verbal forms of the older form of the French language with those of Italian and Spanish.

4. (a) Write as complete an account as you can of all the diphthongs in French, Italian, and Spanish.
- (b) 'D'après leur origine, on peut diviser les diphthongues en cinq classes' ?
5. (a). Give examples of (medial) *r* becoming *l* in Italian, and of *r* final = *l* in Spanish. There is a French example ?
- (b) Of *r* becoming *d* in Italian; is this peculiar to Italian? How do you account for the change? Is there anything parallel in the old Italic languages?
- (c) Of the attraction of *r* by initial consonants in French and Italian; also of the opposite change, in which *r* separates from the initial consonant.
- (d) Is there anything in the cognate languages which may be compared with the modifications undergone by French *chiche*, *Oise* ?
- (e) By what phonetic laws do you explain French *dos*, *dessus*, *pêche*, *chêne* ? Compare the forms in the sister languages.
6. (a) There appears to be only a single example of the change of Latin *t* (medial) into Italian *dd* ?
- (b) Explain Spanish *trigo*.
- (c) Very few really French words admit of the sonant *d* in place of a (medial) *t* ?
- (d) Trace the fall of final *t* in *et*, *aut*, *caput*, through all the Romance languages.
- (e) How do you account for the final consonant in *soif*, *suif*, *Juif* ?
- (f) There are in Italian two pronunciations of the combination *zz*; by what rule do you determine these ?
- (g) What inference would you draw from these two facts: a Gothic chart of the VI. Cy. gives *Kavtsjon*, but *Ulfilas* gives *laiktjo*,—in the transcription of two Latin words ?
- (h) Explain the termination *-azgo* in Spanish.
- (i) Does Latin *tt* ever become sonant in French, &c. ?
- (j) French *père* is Prov. *paire*, but how do you account for the diphthong *ai* in *paire* ?
- (k) Explain our phrase, 'Justices in *eyre*.'
- (l) Give a detailed account of the transformations of Latin *st* (*çt*) in all the members of the Romance family.
7. What foreign elements are to be expected in the following Italian dialects:—Neapolitan, Sicilian, Sardinian, and the Upper-Italian ?
8. (a) How do you classify the dialects of Italian ?
- (b) Construct a table showing the mutual relations of the dialects, mentioning a few of the more prominent characteristics of each.
9. (a) The dialects play a much more important role in French than in Italian ?
- (b) Roger Bacon gives four chief dialects of French ?

(e) Show, with as much fulness of detail as you can, in what the Norman dialect differs from the other main dialects.

10. There are two dialects of the 'Rumonsch'? also two dialects of the 'Romunie'?

11. Give as full a list as you can of Greek words adopted into any of the Romance languages.

1. Write an article on the poetry of Lamartine, with especial reference to this dictum of M. Janin:—'M. de Lamartine, au temple des Muses, sera facilement le premier des poètes parmi les plus illustres (&c.) à l'heure . . . où le monde était libre, amoureux, fidèle et croyant.'

2. Give as much as you can of Fontenelle's 'idée approchante de la poésie et des poètes de son temps.'

3. Compare the early life of Lamartine with that of Chateaubriand, and show the influence exercised on their poetry by their education and the circumstances of their first entrance into literary life.

4. Write an analysis of Lamartine's 'Epître à M. Adolphe Dumas,' quoting as much as you remember of the poem.

5. In the 'Novissima verba,' the following lines occur:—

'ou plutôt, n'es-tu pas une échelle de feu
dont l'échelon brûlant s'attache au pied qui monte,
et qu'il faut cependant que tout mortel affronte?'

Translate and show their relation to the context.

6. (a) What was the poetical *devise* of C. Nodier?

(b) 'Nodier joua les 1001 personnages de la vie du lettré':—

Show how the *devise* and the *jeu* influenced the subject and character of his writings.

7. Write, after Ste.-Beuve, a notice on C. Nodier.

8. (a) What does Ste.-Beuve mean in this criticism on Béranger's poetry: 'on y sent, à de certains moments, que l'espace manque.'

(b) What is Béranger's own judgment (and comparison) of himself as a chansonnier?

(c) In what consists the special merit of Béranger?

9. 'La recherche du grandiose est un peu comme la recherche de l'absolu; il s'est mangé là dedans bien des fortunes littéraires.' From this point of view, write a critique on the poetry of Soumet.

10. 'L'Erostrate a été écrit de mémoire, et non d'inspiration.' What is the subject of this poem, and its relation to the other works of its author?

11. (a) 'Le nom d'Emile Deschamps est, à ce titre, inseparable du nom de V. Hugo.'

What does this refer to?

(b). What are his merits in relation to music?

(c). State what you know of his comedy 'Le Tour de Faveur.'

(d). Quote any of the stanzas of 'Rodrigue pendant la bataille.'

12. (a) 'Mais le grand poète seul sait dégager du mélange des réalités l'élément d'art qui les concentre et les idéalise':—was then the author of 'les Messéniennes' a great poet?

(b) Explain and criticise the following remark:—'l'auteur [des Messéniennes] est fait pour devenir le descendant, par adoption, de cette antique famille littéraire que Racine, le premier, a introduite et naturalisée parmi nous.'

(c) 'Il entra dès lors dans cette voie d'éclectisme littéraire':—this was a false step?

(d) Narrate the circumstances of his reception at l'Académie.

13. 'Prenant successivement les quatre ou cinq grandes idées auxquelles d'ordinaire puisent les poètes,—Dieu, la nature, le génie, l'art, l'amour, la vie proprement dite, nous verrons comme elles se sont révélées aux deux hommes [M. Regnier, A. Chénier], et sous quelle face ils ont tenté de les reproduire.'

Follow Ste.-Beuve in this analysis and comparison, and show how the two poets tend to complete each other reciprocally.

14. (a) There are 'en gros deux espèces de critique'?

(b) 'Ce mot que Bayle a lâché [viz.?] trahit le faible de son génie'?

(c) Quote any passages you remember to show 'à quel degré Bayle possédait l'instinct, la vocation critique.'

(d) Compare Voltaire and Bayle as critics.

15. (a) 'La Bruyère est du petit nombre de ces hommes qui ont tout su'?

(b) 'La B. avait plus d'imagination que de gout.'

(c) 'Il est déjà en quête d'un agrément neuf et du trait.'

(d) 'Le pittoresque, chez lui, s'applique déjà aux choses de la nature plus qu'il n'était ordinaire de son temps.'

Write a critique on La Bruyère, involving these propositions and exhibiting their influence on his writings.

16. (a) Compare the *vis comica* in 'les Femmes savantes' and 'les Précieuses ridicules'; and the stage effect in 'le Misanthrope' and 'le Tartuffe.'

(b) 'Le Misanthrope' is the very type of a comedy of character? the most subjective of Molière's plays?

(c) Contrast the characters of Alceste and Philinte.

Subject for Essay.

L'intention, qui est presque tout dans l'ordre moral, ne compte pour rien dans l'ordre intellectuel; l'art ne s'occupe que des résultats obtenus.

Translate the following into French : —

From that moment all was confusion. The officers on half-pay shouted "Vive l'Empereur!" The Commandant of the fort would have given orders to have them arrested; but the battalion took their part, and the gendarmes assumed an air of unconsciousness. Work was put a stop to; the collectors of tolls and taxes, the registrars, mayor, deputies, &c., grew grey with anxiety, and did not know which side to take. No one ventured to declare himself for Buonaparte, or for Louis XVIII., except the tilers, the masons, the carpenters, and knife-grinders, who could not be turned out, and who would have desired nothing better than to see the others in their place. These men, with their jobbing-knives in their leathern belts, and their packet of tools on their shoulders, made no scruple of crying, "Down with the *émigrés*!" They laughed, too, at the turmoil, which increased visibly.

GERMAN.

MR. BARLOW.

Translate the following passages : —

- (a.) "Uhu! Schuhu! tönt es näher,
 Kauz und Kibitz und der Häher,
 Sind sie alle wach geblieben?
 Sind das Molche durch's Gesträuche?
 Lange Beine, dicke Bäuche!
 Und die Wurzeln, wie die Schlangen,
 Winden sich aus Fels und Sande,
 Strecken wunderliche Bande,
 Uns zu schrecken, uns zu fangen;
 Aus belebten derben Masern
 Strecken sie Polypenfasern
 Nach dem Wanderer. Und die Mäuse
 Tausendfärbig, schaarenweise,
 Durch das Moos und durch die Heide!
 Und die Funkenwürmer fliegen,
 Mit gedrängten Schwarme-Zügen,
 Zum verwirrenden Geleite."
- (b.) "Wohlan! so theile deine Einsicht mir
 Denn mit. Lass mich die Gründe hören, denen
 Ich selber nachzugrübeln nicht die Zeit
 Gehabt. Lass mich die Wahl, die diese Gründe
 Bestimmt—versteht sich, im Vertrauen—wissen,
 Damit ich sie zu meiner mache.—Wie?
 Du stutzeest? wägst mich mit dem Auge?—Kann
 Wohl seyn, dass ich der erste Sultan bin,
 Der eine solche Grille hat, die mich
 Doch eines Sultans eben nicht so ganz
 Unwürdig dünkt.—Nicht wahr? So rede doch!
 Sprich:—Oder willst du einen Augenblick,

Dich zu bedenken? Gut, ich geb 'ihn dir.—
 (Ob sie wohl horcht? Ich will sie doch belauschen;
 Will hören, ob ich 's recht gemacht.—) Denk'nach!
 Geschwind denk'nach! Ich säume nicht, zurück
 Zu kommen."

- (c) "Alle Gestalten sind ähnlich, und keine gleicht der andern;
 Und so deutet das Chor auf ein geheimes Gesetz,
 Auf ein heiliges Räthsel. O könnt ich dir, liebliche Freundin,
 Ueberliefern sogleich glücklich das lösende Wort!
 Werdend betrachte sie nun, wie nach und nach sich die Pflanze,
 Stufenweise geführt, bildet zu Blüthen und Frucht.
 Aus dem Samen entwickelt sie sich, sobald ihn der Erde
 Stille befruchtender Schoos hold in das Leben entlässt,
 Und dem Reize des Lichts, des heiligen, ewig bewegten,
 Gleich den zärtlichsten Bau keimender Blätter empfiehlt.
 Einfach schlief in dem Samen die Kraft; ein beginnendes Vorbild
 Lag, verschlossen in sich, unter die Hülle gebeugt,
 Blatt und Wurzel und Keim, nur halb geformt und farblos;
 Trocken erhält so der Kern ruhiges Leben bewahrt,
 Quillet strebend empor, sich milder Feuchte vertrauend,
 Und erhebt sich sogleich aus der umgebenden Nacht."

(d). "Den Eintretenden empfing Herr Itzig in zwei kleinen Geschäfts-
 stuben, von denen die erste wenig Möbel, aber zwei auffallend schöne
 Lampen enthielt; eine gelegentliche nothwendige Uebnahme für nicht
 gezahlte Zinsen eines Solawechsels. Die zweite war das Schlafzimmer,
 ein einfaches Bett, ein langes Sopha, ein grosser runder Spiegel mit
 breitem Goldrahmen, dieser ein Erwerb aus dem geheimen Lager des
 ehrlichen Pinkus. Itzig selbst hatte sich auffallend verändert, er war
 an trüben Tagen bei dem zweifelhaften Lichte, welches aus dem Ho-
 fraume in die Stuben gelangte, von Weitem betrachtet, nur noch wenig
 von einem eleganten Herrn verschieden. Sein schmales Gesicht war
 voller geworden, die grossen Sommersprossen, welche ihn früher getigert
 hatten, waren verblichen, und sein Haar hatte durch Pomade und kunst-
 volle Bürstenstriche eine dunklere Farbe und ein anschniegenderes Wesen
 erhalten. Noch hatte der neue Geschäftsmann eine Vorliebe für schwarze
 Kleider, aber sie waren neu und sassen nicht mehr schlottrig über seine
 Gliedmassen. Denn Herr Itzig hatte auch zugenommen an äusserer
 Behaglichkeit, er gönnte sich jetzt gute Kost, ja auf seinem Arbeitstisch
 war zuweilen eine leere Weinflasche zu sehen, auf welcher das Wort
 Mosel stand, daneben ein Zuckerbecher und ein silberner Löffel."

(e). "S' isch einisch e Chönig gsi, woner gregiert hat und wiener
 gheisse hat weiss i nümme. De het kei Sohn gha, nummene einzige
 Tochter, die isch immer chrank gsi, und kei Dokter het se chönne heile.
 Do isch em Chönig profizeit worde si Tochter werd se an Öpfle gsund
 esse. Do lot er dur sis ganz Land behant mache wer siner Tochter Öpfel
 bringe, dass se se gsund dar chönn esse, de muesse zur Frau ha und
 Chönig wärde. Das het au ne Pur verno, de drei Söhn gha het. Do
 säit er zum elste 'gang ufs Gade ufe, nimm e Chratte (Handkorb) voll
 vo dene schöne Öpfle mit rothe Bagge und träg se a Hof; villicht cha se
 d' Chönigstochter gsund dra esse und de darfsche hürothe und wirsch

Chönig.' De Kärle hets e so gmacht und der Weg under d'Füess gno. Woner e Zitlang gange gai isch, begegnet es chlis isigs Manndle, das frogt ne was er do e dem Chratte häig, do seit der Uele, denn so het er gheisse, 'Froschebäi.'"

GERMAN LITERATURE.

MR. BARLOW.

1. In Book iv. of "Aus meinem Leben" Goethe gives his readers a tolerably extensive sketch of the Old Testament history. He then observes:—"Vielleicht möchte jemand fragen, warum ich diese allgemein bekannten, so oft wiederholten und ausgelegten Geschichten hier abermals umständlich vortrage." What is his answer?

2. Give his description of his three friends, Olenschlager, Reineck, and Hüsgen.

3. Criticise the following remarks on Lessing's "Nathan der Weise." "Also nicht die Feindseligkeit gegen das Christenthum, oder eine andere positive Religion, war die Seele des Gedichts, vielmehr die milde menschliche Ueberzeugung und Gewissheit, dass in allen diesen Glaubensformen ein einfacher klarer Geist der reinen, in Liebe sich kundgebenden Menschlichkeit dann möglich sei, wenn das Menschenwerk der Religion das Gotteswerk nicht ersticke."

4. "Zeigt! Das ist eine Pracht von einem Becher!
 Von Golde schwer, und in erhabner Arbeit
 Sind kluge Dinge zierlich drauf gebildet.
 Gleich auf dem ersten Schildlein, lasst man sehn!
 Die stolze Amazone da zu Pferd.
 Die übern Krummstab setzt und Bischofsmützen,
 Auf einer Stange trägt sie einen Hut,
 Nebst einer Fahn,' worauf ein Kelch zu sehn."
 Könnt ihr mir sagen, was das all' bedeutet?

5. Write notes on the following passages:—

- (a) "Wohl weiss ich, dass die ird'schen Dinge wechseln,
 Die bösen Götter fordern ihren Zoll.
 Das wussten schon die alten Heidenvölker:
 Drum wählten sie sich selbst freiwill'ges Unheil,
 Die eifersücht'ge Gottheit zu versöhnen,
 Und Menschenopfer bluteten dem Typhon.
 Auch ich hab' ihm geopfert—Denn mir fiel.
 Der liebste Freund, und fiel durch meine Schuld."

- (b) "So ein Bramarbas und Eisenfresser,
 Will einnehmen alle festen Schlösser.
 Rühmte sich mit seinem gottlosen Mund,
 Er müsse haben die Stadt Stralsund,
 Und wär' sie mit Ketten an den Himmel geschlossen.
 So ein Jehu und Holofern,
 Verläugnet, wie Petrus, seinen Meister und Herrn:
 Drum kann er den Hahn nicht hören krähn."

- (c) "Hinter dem U kommt gleich das W,
Das ist die Ordnung in A B C."
- (d) "Das kommt nicht aufs Kerbholz. Ich geb' es gern.
Gute Verrichtung, meine Herrn!"
- (e) "Eilf! Eine böse Zahl. Zwölf Stühle setzt!
Zwölf Zeichen hat der Thierkreis, fünf und sieben;
Die heil'gen Zahlen liegen in der Zwölfe."
- (f) "Tiefsinn'ger wurd'er, dass ist wahr, er wurde
Katholisch. Wunderbar hatt' ihn das Wunder
Der Rettung umgekehrt. Er hielt sich nun
Für ein begünstigt und befreites Wesen,
Und keck, wie Einer der nicht straucheln kann,
Lief er auf schwankem Seil des Lebens hin."
- (g) "Was ihr den Geist der Zeiten heisst,
Das ist im Grund der Herren eigner Geist,
In dem die Zeiten sich bespiegeln.
Da ist's dann wahrlich oft ein Jammer!
Man läuft euch bei dem ersten Blick davon.
Ein Kehrtrichtfass und eine Rumpelkammer,
Und höchstens eine Haupt und Staatsaction,
Mit trefflichen pragmatischen Maximen,
Wie sie den Puppen wohl im Munde ziemen!"
- (h) "Ihr seid wohl spät von Rippach aufgebrochen?
Habt ihr mit Herren Hans noch erst zu Nacht gespeist?"
- (i) "Zum jüngsten Tag fühl' ich das Volk gereift,
Da ich zum letzten Mal den Hexenberg ersteige,
Und, weil mein Fässchen trübe läuft,
So ist die Welt auch auf der Neige."
- (j) "Wir sind so klug und dennoch spukt's in Tegel.
Wie lange hab' ich nicht am Wahn hinausgekehrt,
Und nie wird's rein, das ist doch unerhört!"

MR. MAHAFFY.

1. Explain the following passages from Heine's *Harzreise* :—

- (a). Dort wohnen dumme Kropfleute und weisse Mohren.
(b). Mein Cicerone war eine kreuzerliche, pudeldeutsche Natur.
(c). Solch ein Thier war barmherziger als die Menschen, und säugte den schwachmüthigen Schmerzenreich der heiligen Genoveva.
(d). Wie die glaubhafte Amme es erzählt, und wie es zu schauen ist auf den hübschen Faustbildern des Meister Retzsch.

2. What passage in the *Harzreise* is evidently suggested by a famous scene in Goethe's *Faust*?

3. How does Heine explain the psychological conditions of the growth of fairy tales?

4. Translate:

In ä Garte
Bin i gestande

Ha de Imbli
Zugeschaut!
Hänt gebrummet
Hänt gesummet,
Hänt Zelli
Gebaut.

Mention the chief peculiarities of this dialect.

5. Who is the author, and what the context of the following :—

Am jüngsten Tag, wenn die Posaunen schallen
Und alles aus ist mit dem Erdeleben
Sind wir verpflichtet Rechenschaft zu geben
Von jedem Wort, das unnütz uns entfallen.

6. What modern English parallel is there to Goethe's poem on Johanna Sebus?

7. Explain

Eigenheiten, die werden schon haften
Cultivire deine Eigenschaften.

8. What is the attitude of Goethe's poem entitled *Prometheus*?

9. What is the idea of Goethe's *Vorklage* to his poems? What later poet has expanded it in a prose Preface?

10. At the opening of his autobiography, Goethe guards against a mistake which has misled Mill?

11. Translate

Eines Mannes Rede
ist keines Mannes Rede
Man soll sie billig hören Beede.

12. What scene in Goethe's *Faust* was evidently suggested by the neighbourhood of his native town?

13. What were the French poets who influenced him in early youth? What does he say of Molière?

14. How does he contrast natural and revealed Religion as to their evidence?

15. What curious reflection does he make on Lavater's religious writings?

16. In what connexion do the following lines occur:

- (a). Ernst ist das Leben, heiter ist die Kunst.
(b). Nun ist der Lämmel zahm.
(c). Den Samen legen wir in ihre Hände
Ob Glück, ob Unglück aufgeht, lehrt das Ende.
(d). Es gibt kein Zufall
Und was uns blindes Ungefähr nur dünkt
Gerade das steigt aus den tiefsten Quellen.

17. Translate "die Noth ging nuerst recht an, und ich hatte Zeit genug, mir den seltsamsten Roman von traurigen Ereignissen und einer unvermeidlich tragischen Katastrophe anzumalen." In what connexion does this passage occur?

18. Where do the following lines occur? Translate them:—

- (a.) Die bösen Götter fordern ihren Zoll.
Das wussten schon die alten Heidenvölker.
- (b.) O die Zeit ist
Ein wunderthät'ger Gott. In einer Stunde rinnen.
Viel tausend Körner Sandes.
- (c.) O Fluch der Könige, der ihren Worten
Das fürchterliche Leben gibt, dem schnell
Vergängliche Gedanken gleich die That
die fest unwiderruffliche, anketet.

19. Give the sense and connexion of the following:—

- (a.) Wir hätten einen Nero jetzt
Statt Landesväter drei Dutzend
Wir schnitten uns die Adern auf
Den Schergen der Knechtschaft trutzend.
- (b.) erlöse uns nur
von jenem Zwitterwesen
Von jenem Kamaschenritterthum
Das ekelhaft ein Gemisch ist
Moderner Lust und gothischen Wahns
Das weder Fleisch noch Fisch ist.
- (c.) Es ist ein König in Thule, der hat
'Nen Becher, nichts geht ihm darüber
Und wenn er aus dem Becher trinkt
Dann gehen die Augen ihm über.
- (d.) Ich höre sein Geist ist abgebrannt
Und war versichert bei Bieber.

20. What is the substance of Heine's Preface to his *Deutschland*?

1. Give the substance of Schleiermacher's eulogy of Novalis. Sketch the plan of Novalis' prose Romance. What are the peculiarities of his Devotional Hymns?
2. Discuss the literary obligations of Tieck to Goethe.
3. Compare the elder and younger Schlegel.
4. Who was the author, and what the plan of the work entitled *der zerbrochene Krug*?
5. What does Barthel consider the best epic of the Romantic school? Describe it briefly.
6. Describe the attitude of Uhland's school in the history of German literature.
7. What are the peculiarities of Chamisso's life? Give parallels from other literatures.
8. What poets furnished Schubert with the words of his best songs?
9. What were the effects of Hegel's philosophy on German poetry?
10. Give some account of L. Börne.

11. Describe the following works, giving the authors' names:—

der Ritter vom Geiste.

Atta Troll.

der neue Münchhausen.

12. What idea in Goethe's *Faust* is developed in Kinkel's *Abendstille*?

13. Barthel shows that Reinick's songs are the reflex of his life. Who may be placed beside him in German literature.

14. Give some account of Herwegh.

15. Who are the authors of the following:—

Lucinde, die Kronenwächter; die Elizire des Teufels, Was ist des Deutschen Vaterland; das Frühlingslied des Recensenten; Krieg den Philistern; Liebesfrühling; Nala und Damajanti; Tristan und Isolde; Schrift und Volk; der Mohrenfürst.

16. From what poems are the following lines:—

(a) Recht, Sitte, Tugend, Glauben und Gewissen
 Hat der Tyrann aus deiner Brust gerissen
 Errette sie mit deiner Freiheit Sieg.

(β) das Grosse Licht der Zeiten
 schloss ewig deine Nacht.

(γ) O Mensch, wenn noch so hart du bist
 In dir ein Funke Gottes ruht.

(δ) Ihr tausend Blätter im Walde wisst
 Ich hab' schön-Rohtrauts Mund geküsst
 Schweig 'stille, mein Herze!

(ε) Lass klaglos hier und friedsam mich erleichen
 Was frommte mir annoch in später Stunde
 Zu wandeln, eine Leiche, über Leichen.

(ζ) Dir Mond, der ist ihr Buhle
 Er weckt sie mit seinem Licht
 Und ihm entschleiert sie freundlich
 Ihr frommes Blumengesicht.

(η) die Gliederzartwuchsrichtige
 Vollmondsangesichtige.

17. What women have taken a high place in modern German literature?

COMPARATIVE GRAMMAR.

DR. ATKINSON.

1. (a). In what classes of words is the nom. plural of neuter nouns in A.-Sax. formed in *u*?

(b). In what words are the stems strengthened by the addition of the syllable *er* before the case-endings in the plural?

2. (a). In the 2nd declension, how do you account for the loss of the final *u* in some roots?

(b). Decline *dâd, bôc, mûs*.

(c). Explain by the cognate languages the alteration of the root-vowel in the plural of certain words.

3. Construct a table showing clearly the changes produced by *i*-umlaut, and illustrate by examples from the actual inflectional and conjugational forms.

4. Taking the Gothic verbs — *ita, viga, visa, saihva, giba* of the [March's 1st] Xth (Grimm) conjugation, show the operation of these principles,—umlaut, ablaut, and breaking, in the A.-Sax., Mod. Germ. and English representatives of the above verbs.

5. (a). Do the same with these Gothic verbs *nima, baira, stila*, of the XI. conj.

(b). Give as many examples as you can of A.-Sax. verbs with radical *i* [*beidaifgi* verbs], tracing their equivalents in German and English, and connecting with the Gothic roots.

6. Trace the verbs *scathe, shake, shave*, through all the related languages, showing the results of breaking and levitation in this (VII. *bado-foga*) conjugation (March's 4th).

7. (a). Show the operation of *l*-breaking in A.-Sax. in *fall, hold, walk*.

(b). The umlaut *y* occurs in these verbs?

8. Give the principal forms of *sweep, know, sow, blow*—tracing the influences of *i*-umlaut, progression, and labial assimilation, when they occur.

[In questions 6–8, the parallel forms should be given in Gothic, A.-Sax., German, and English, adding, where possible (or desirable for any peculiarity), the Old H. Germ., and Old Norse forms.]

9. (a). Give as many as you can of the irregular verbs of the *a*-conjugation.

(b). Trace the preterite-presents in A.-Sax.

10. Decline the personal pronouns *ic, thu*, and the demonstratives *thes, theôs, this*, in A. Saxon and the cognate languages.

11. Write out the Gothic and A.-Sax. declensions of the adj. both in the definite and indefinite forms.

12. Construct a comparative table of the declension of the representatives of the pronominal stem *sa* (*ta*), in Sanskrit, Greek, Latin, Gothic, Old High German and A.-Sax.

EXAMINATION FOR LICENSE IN ENGINEERING.

MECHANICS AND HYDROSTATICS.

MR. GALBRAITH.

1. A hemispherical bowl 20 inches in diameter and 20 lbs. in weight floats in water; find how far it will sink, and if disturbed, through a small angle find the time of an oscillation.
2. Deduce the equation of motion of a solid body round a fixed axis, either from D'Alembert's principle or from the principle of accumulated work.
3. Define the centre of percussion and show that it is identical with centre of oscillation.
4. How is the angular velocity of a heavy body round a fixed axis connected with the vertical motion of its centre of gravity?
5. Deduce the expression for the moment of inertia round an axis through any point in terms of the moments round the three principal axes passing through the point.
6. Deduce from Hook's law of tension, the expression for the moment of rupture.
7. Investigate the quantity of motion communicated by the blow of a tilt-hammer falling from a given elevation.
8. If several given loads be applied at given points of a girder supported at each end, what is the bending moment at any assigned point of the girder?
9. What are the conditions of equilibrium of any number of force acting in the same plane?
10. Apply these conditions to find the position of equilibrium of a straight beam whose ends rest on two inclined planes, taking friction into account.

MR. LESLIE.

1. What methods are usually employed for finding the densities of solids or liquids on the principle of Archimedes, and how is this principle most readily verified?
How has Torricelli's theorem been used by Bunsen to find the density of coal-gas?
2. Describe the different kinds of barometers and sympicometers, stating the various corrections required in each, and the mode of reading them?
3. Deduce a formula for the measurement of heights by a barometer. Explain the principle upon which a boiling-point thermometer is used to measure heights, and give experiments to illustrate it.

4. Explain the different methods of verifying Boyle's law of pressures by experiment; and apply this law to the graduation of an ordinary steam pressure-gauge.
 5. Give the theory of the double-acting steam-engine. The cylinder of a non-condensing engine is 18 inches, the evaporation of the boiler is 0.58 cubic feet per minute, and the velocity of the piston is 200 feet. Calculate the horse-power, steam being admitted during the whole stroke.
 6. If the engine referred to in the last question be provided with a condenser, the velocity being 300 feet, and steam cut off at half stroke; find the horse-power.
 7. Form the general equation which connects the rate of speed with the weight and evaporation of a locomotive.
 8. Deduce the equations on which the working of a single-action engine depends.
 9. How is the heat utilised on external work calculated when water is converted into steam?
A gallon of water is evaporated at a pressure of 15 lbs., how much heat is utilised?
 10. If the pressure of steam be 70 lbs., what weight of injection water at 60° F. will be required to condense 1 lb. of steam after the conclusion of the stroke?
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DR. DOWNING.

1. What is the law of the strength of timber posts or pillars, and the constant for those of red deal? Compute the ultimate strength of a pillar of that kind of wood 10 feet high and 10 inches square in its transverse section. If this latter had been 8" by 12", and length also 10 feet, compute its ultimate strength.
2. Describe fully the process of making Bessemer steel, and, by a comparison with the former methods of obtaining steel in large quantities, point out the economy of the first-named process. Also give the ultimate strength of Bessemer steel to compressive and to tensile forces, noting particularly the cause of the wide range of the latter.
3. A timber beam 12 inches square in transverse section, and 15 feet long in clear span, is broken, on an average, by a weight of 14 tons applied at the centre. Compute from this the ultimate strength of a timber bridge 34 feet in clear span, and having five girders each in transverse section, 24 inches deep and 6 inches wide, the load being uniformly distributed over the whole of the planking.
4. In the last question the girders are formed of two pieces placed over each other to obtain the beam 24" x 6"; and some of them are cut from barks of timber not quite straight, and also 12" x 10" at one end and 12" x 14" at the other, how would you construct from such a bark a uniform beam as above, and how unite the two pieces, and connect the five girders in the structure. If several successive openings are spanned by continuous timber girders, how in this case may the two pieces forming the girders be most advantageously arranged? Give a specification

of a timber bridge, including the planking, &c., from that given you in the course for the senior class.

5. The points best suited for the entrances to a tunnel having been selected, describe the method by which the centre line between them may be laid out in the first instance, with some approach to accuracy, the intervening ground being of a rugged character, and the tunnel having considerable length. Describe next the circumstances which will determine the best points for the ranging towers or observatories, and also the best points at which to sink the shafts on the centre line, and give fully the method of using the transit instrument in the several towers so as to determine with great accuracy the centre line at the shafts: add the method of transferring the range from the surface to the headings below, and also of transferring the levels to the tunnel.

6. If f be the fall in feet per mile of any pipe, and d the diameter in feet, prove that v , the velocity in feet per second, is nearly

$$v = \frac{2}{3} \sqrt{f.d}$$

If d be given in inches, what must now be the numerical coefficient?

7. A channel for conveying water has a transverse section whose form is a segment of a circle 8 feet in depth at the centre, and 22 feet wide at the water surface; compute, by the approximate methods given you, the transverse area and border of this channel.

8. And also compute the number of gallons per diem the channel in the last question can convey with a fall of 6 inches per mile. The calculation may be performed by the approximate results in No. 7, or else by the exact method for the area and border of a segment of a circle.

9. A bar of wrought iron having a section of one square inch is supposed to be suspended between two points on the same level 420 ft. apart, and having a dip at the centre of 30 ft., what is the tensile strain, in tons per square inch, at the centre and at the points of suspension arising from the weight of the bar itself, the curve being approximately taken to be a parabola?

10. From the results obtained in No. 9 compute the transverse section required in the main chains of a suspension bridge of the above span and dip at the centre. The metal in the chains having a tensile resistance of 22.5 tons per square inch; the coefficient of safety being such that the strain from all sources when fully loaded is to be only $\frac{1}{3}$ th of the ultimate resistance. The greatest moving load is estimated at 90 lbs. per square foot over all the span, and the uniformly distributed fixed load of the structure 0.29 tons per foot run. The width of roadway and two footpaths being together 30 ft.

11. If the back chains in No. 10 be supposed each to be identical with the contiguous half chain, and free to move on the top of the towers, compute the increase of the dip of 30 feet by an increase of 60° of temperature, the rate being supposed $\frac{1}{10000}$ of the length for each 15° of change. Give also the description of the methods adopted both at Clifton and at Pesth for the free motion of the chains on the summit of the towers in those suspension bridges.

12. The same method of determining the quantity of metal in the chains of a suspension bridge (Nos. 9 and 10) may be applied to deter-

mine the quantity required in a horizontal girder. Explain this in the manner in which it has been shown you, and apply it to the case of a pair of girders 84 feet in clear span and 7 ft. in depth, to carry together a uniform load of $2\frac{1}{2}$ tons per foot, the greatest strain in the metal being, in either flange, but 4 tons per square inch. If not as above, prove and apply Mr. Anderson's rule for the weight of uniformly loaded girders whose depth is $\frac{1}{12}$ th of the space.

13. State and prove the expression given you for the area a of the upper or lower flange of a parallel wrought iron girder, at the centre, whose clear span is l and depth d ; the fixed load of bridge and platform which is borne by each girder being w' in tons, and the moving load (also uniformly distributed) represented by w in tons. The greatest strain to which it is proposed to subject either flange being s in tons per square inch. Also compute the area a' of the flange at any point whose distance from the nearest abutment is x .

14. Compute the velocity and discharge in the case of a cast iron pipe 45 inches in diameter, flowing full under pressure with a fall of 1 in 352. The velocity is to be given in feet per minute, and the discharge in gallons per diem.

15. Calculate the diameter of each of two equal pipes which, with the same inclination as above, will give together the same discharge; and give the general expression from which all such questions may be solved.

16. The crest of a newly constructed weir is raised one foot above the plane of the surface of a river which has a uniform fall of 3 feet per mile. Compute by the approximate method given in the Text-book the furthest distance upstream at which the weir will have any effect in raising the surface of the river, the water flowing over the crest with a depth of 6 inches; and also calculate the height which the surface of the river is elevated at the point midway between the weir and the furthest distance above mentioned.

17. Compute the discharge and mean velocity of a river having a rectangular transverse section 100 feet wide, the water flowing 2 feet deep, and the rate of inclination being one in 2112. At a certain point in its course the inclination increases to one in 1760, compute the depth and mean velocity when it has arrived at a uniform rate. In this last the hydraulic mean depth may approximately be taken as equal to the depth.

18. Prove that the transverse area of a channel of best discharging form with side slopes making the angle β with the horizon, is given by the expression

$$\text{Area} = p^3 (\tan \frac{1}{2} \beta + \text{cosec } \beta),$$

in which p is the depth of water at the centre.

19. Calculate the mean velocity and discharge of the following design for a new channel in the improvement of a river. Depth of water, 4 ft., bottom width 24 ft., slopes $1\frac{1}{2}$ to 1, and fall 3 ft. per mile.

20. From the mean velocity above computed deduce that at the surface in the centre line, and at the bottom, from the ordinary approximate rule for deriving the mean velocity from the observed maximum at (or a little below) the surface.

21. An impounding reservoir, which derives its supply from an area or rain basin of $9\frac{1}{2}$ square miles, has an overfall weir the crest of which is placed at the level of the proposed highest surface of the water. What must be the length l of this weir so that the water flowing over may not rise to more than one foot above the line of the crest, the greatest flood being taken as that resulting from a rainfall of 2 inches over the whole area, which is carried into the reservoir with a uniform rate of discharge in 8 hours. Compute the length l of the crest.

22. Draw a transverse section of a weir, showing clearly the construction of the upstream and the discharging faces of the structure, and for the base assume first a foundation of sound rock, and again a gravelly clay not very uniform or reliable. And also give a specification in each case.

23. In Bidder's Tables for Earthwork what numbers are to be found at the intersection of the lines of figures at 15 and 37; and apply them to the computation of the volume in cubic yards of a portion of a cutting whose base is 33 ft., slopes $2\frac{1}{2}$ to 1, and in which the end heights of 15 ft. and 37 feet are at a distance of 231 feet apart.

24. If the above had been taken out by the methods of mean area and of mean heights, what volumes would have resulted? the answers to be in cubic yards; and write out fully the algebraic proof of the relation between the three methods of computing.

25. The small land tubes in the Britannia Bridge have a clear span of 230 ft., and a depth of 23.4 ft., the sectional area to resist tension at the bottom being 414 square inches, and at the top 580 square inches, and their weight may be taken as a uniformly distributed load of 600 tons. Compute by the approximate method of the bent lever and a given constant the load which, if applied at the centre, would, together with its own weight, break such a tube. The constant for the bottom in tension being 74.4.

Also calculate the strain in tons per square inch in the top and bottom from the weight of the tubes themselves.

26. Point out clearly and fully how the constant 74.4 has been derived from the experiments on the large model at Milwall; and prove the general relation between the constant for beams and the ultimate strength as given Mr. E. Clark. Why is this constant so seldom employed at present in computing the strength of railway girders?

27. The deflection of the Conway tube, 400 ft. span, from its own weight being 9 inches, compute that of the great span of the Britannia tube, 460 ft. span, on the supposition, very nearly true, that the tubes were similar.

The actual deflection in one tube, 460 ft. span, however, being, as observed, 12.57 inches, the weight being uniformly distributed. Calculate from this the deflection per ton of weight laid on at the centre point, giving also a proof of the relation between the deflection from a uniform load and the same weight applied at the centre point.

28. Draw up in a tabular form the weights per cubic foot and number of cubic feet to the ton of the following substances:—(1) Lead (2) wrought iron, (3) cast iron. (4) granite, (5) limestone, (6) Aisler masonry, (7) rubble masonry, (8) brickwork, (9) Portland cement con-

crete, (10) coal, (11) fresh, and (12) salt water. And in the case of the numbers 6, 7, 8, 9, give the ultimate resistance to compression.

29. Explain and sketch the arrangement of fire-proof buildings with lines of cast iron columns superimposed, and sketch, with words of reference, the details of the design of the base of the columns and of the connecting pieces at the level of the several floors. Give the same with timber beams, joists, and flooring for corn stores having lines of cast iron columns within the building, in this case also giving the details.

30. By what series of experiments were the laws of the strength, and the constant, in cast iron pillars deduced; and what were the changes in the law observed as the proportion of length to diameter was altered? What is the advantage derived from making the columns hollow instead of solid?

31. Give specifications of the masonry and brickwork for retaining walls—

(a.) Brickwork for a dock wall, with stone coping, depth of water in dock 20 ft.; the foundation and filling in at back of wall being clay?

(b.) Aisler masonry in front work, and rubble or concrete backing, with coping, for a quay wall. Depth at low water in front 18 feet, rise of tide 10 feet.

(c.) Aisler masonry in front work, and backing of brickwork.

32. Give a specification of a single arch bridge in a railway cutting, the arch having in one case stone voussoirs in the front, and sheeting of brickwork; in the other the sheeting of stone masonry—all else being the same in both. If the bridge be oblique, add what is necessary in the specification for this case.

MINERALOGY AND CHEMISTRY.

DR. APJOHN.

1. Chlorine may be obtained with the aid of hydrochloric acid from pyrolusite, bichromate of potassium, or bleaching salt of lime. Give the reaction in each of these cases.

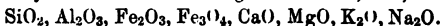
2. If carbonic anhydride be conducted into lime water, a white precipitate forms; but, continuing the introduction of the gas, a clear solution is obtained; lastly, if to this solution oxalate of ammonium be added, another white precipitate falls. Explain these different results.

3. How do fat and meagre limes differ in composition; and how, without resorting to analysis, could you distinguish between them?

4. The degree of hydraulicity of a lime might be estimated by analysis. How is this accomplished?

5. Write the formula of phosphate of lime, and explain the change which it experiences when converted into superphosphate by a suitable quantity of sulphuric acid.

6. Many clays include the following constituents, viz.,



How would you make the analysis of such a mixture?

7. Write the formula and crystalline systems of the following minerals, viz.: albite, mispickel, copper pyrites, spathose, iron, and iron pyrites.

8. There are three varieties of phosphoric acid: how is each prepared, and how are they distinguished from each other?

9. A soluble chalybeate salt, upon analysis, gave the following results:—

SO ₄,	. . . .	51.34
Fe,	. . . .	14.97
NH ₄,	. . . .	9.62
H ₂ O,	. . . .	24.06
		99.99

From these data deduce its formula.

10. What is the process for making hyposulphite of sodium, and how do you explain its action in decolorizing a solution of iodine

SCHOOL OF ENGINEERING.

MIDDLE AND JUNIOR CLASSES.

MECHANICS AND HYDROSTATICS.

MR. GALBRAITH.

1. Define the centre of gravity, and find its position in some one of the following solid figures:—a segment of a right cone, a segment of a sphere, a segment of a paraboloid of revolution.

2. Define the centre of hydrostatic pressure, and find its position in a submerged circular plane not parallel to the surface of the fluid.

3. State the laws of friction, and investigate the ratio of the power to the resistance in the screw, friction being taken into account.

4. Explain the reason why a siphon draws off fluid from an upper to a lower level.

5. Deduce the expression for the time of vibration of a simple pendulum. If a simple pendulum vibrates 7 times in 22 seconds find its length.

6. What is the limit of height to which water can be raised in the common pump? In the common pump what is the actual pressure on the piston?

7. A straight beam rests with its extremities on two inclined planes; find its inclination to the horizon when it is in equilibrium.

8. Find the equation for determining the depth to which a hemispherical bowl, whose radius is r inches and weight w lbs., will sink in water.

9. What is the position of its Metacentre? And what the moment of buoyancy for a given deflection θ ?

10. Deduce the equation of motion of a rigid body round a fixed axis, and give the construction for the length of an equivalent simple pendulum.

11. Prove that the velocity of the centre of gyration of a heavy body is that due to the height fallen through by the centre of gravity.

12. Deduce the equation for the diving bell, taking into account change of weight and temperature of the air in the bell.

MR. W. ROBERTS.

1. Being given $\sin \theta = \frac{5}{13}$, $\tan \phi = \frac{33}{56}$, find $\sin(2\theta + \phi)$.

2. If through the vertex C of a triangle two lines be drawn respectively perpendicular to the sides a and b , prove that the portion intercepted between them on the base c is equal to $c \tan A \tan B$.

3. Being given n circles whose radii are 1 ft., 3 ft., 5 ft., . . . $(2n-1)$ ft.; let a line equal to the sum of their circumferences be one side of a rectangle. What must the other side be if the area of the rectangle is four times the area of a circle whose radius is n ft.?

4. The altitude of a cone is 16 ft., and the cotangent of its semiangle is $\frac{16}{63}$; find the ratio of the superficial area of the cone to that of a sphere whose radius is 25 ft.

5. If the base of a cylinder be equal to the entire superficial area of a sphere, find its height so that its solid contents may be equal to those of the sphere.

6. Give a formula for the measurement of areas by the method of equidistant ordinates, and apply it to find the area, being given in feet the following fifteen ordinates: 0, 5.5, 7.75, 9.25, 12, 13.375, 15, 17, 16, 14.5, 11.25, 9, 7, 5, 3.5, with an interval of 2.5 ft.

7. Let ABC be a right-angled triangle, BC being the hypotenuse. Draw through A a line meeting the hypotenuse in P , so that if Q be the foot of the perpendicular let fall from P on AC , the triangle APQ may be the greatest possible.

8. If $u = \frac{x}{\sqrt{1+x^2}} + \frac{\sqrt{1+x^2}}{x}$, find $\frac{du}{dx}$.

9. The base c of a triangle is 1229, and the angles at the base are respectively $38^\circ 47' 8''$ and $54^\circ 20' 14''$; find the sides a, b .

10. In order to ascertain the mutual distance of two inaccessible objects C and D , a base line AB is laid down of 1000 yards in length. Measurement gives the following angles:

$$\begin{aligned} BAC &= 111^\circ 20' 36'', & BAD &= 25^\circ 14' 38'', & ABD &= 145^\circ 30' 22'', \\ & & ABC &= 55^\circ 10' 52''. \end{aligned}$$

Hence calculate CD .

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9. On what grounds does Mill affirm that the methods of physical and mental philosophy, and the social science must be principally deductive? Why is chemistry not a deductive science? Some of the most important mental phenomena exhibit characteristics unsuited for either the experimental or the deductive method of investigation.
10. How are fallacies of observation classified by Mill, and what are the principal causes which lead to them? How does Mill show that a general proposition, collected from particulars may be more certainly true than any of the particular propositions from which it was inferred?
1. How does Kant arrive at the supreme principle of Morality? Give an analysis of a morally good action? The actions enjoined by the Moral Law form two classes? Show how Kant's formula applies in the case of an action belonging to each class.
2. Show how the categorical imperative of the Moral Law is deduced, and that it must hold good for every rational being whose actions are practical.
3. What is the Antinomy of the pure practical Reason? How is it solved by Kant? What result as to the nature of the *summum bonum* follows from this solution?
4. How does Kant define a Postulate of pure practical Reason? How does it differ in its character from a Postulate of Nature? How does he meet the statement that we cannot apprehend the objective reality of its object? Though partly dependent on the subjective condition of the subject, Postulates are nevertheless valid?
5. Describe the mode in which, on Kant's principles, the Moral Law originates.

Examinations in Experimental Science.

Examiners.

J. H. JELLEY, B.D.

JOHN R. LEAH, M.A., Professor of Experimental Science.

JAMES ARTHUR, M.D., Professor of Chemistry.

GEORGE L. CATHART, M.A.

LIGHT AND SOUND.

MR. JELLEY.

1. Describe Foucault's method for measuring the velocity of light.
- (a). The result so obtained differs from that obtained by the eclipses of Jupiter's satellites. Show that some errors have been anticipated.

11. Let the sides of a triangle be 500, 893, 1167; find the sum of the cosines of the angles of the triangle.

12. Construct by descriptive geometry the angles made by a given plane with the planes of projection.

JUNIOR CLASS.

CHEMISTRY AND MINERALOGY.

DR. APJOHN.

1. How do you prepare nitrogen gas, and distinguish it from carbonic anhydride?

2. Write the formula of nitrate of ammonium, and explain how nitrous oxide may be obtained from it.

3. How would you manufacture ferrous chloride, and convert it into ferric chloride? Mention also the tests for iron in these two conditions.

4. Write the formula of nitric acid, and explain its action upon carbonate of silver and carbonate of calcium.

5. Enumerate and explain the best tests for the presence in a solution of sulphuric, hydrochloric, or nitric acid.

6. Explain how hydrate of sodium may be obtained from carbonate of sodium, and how the former acts upon a hot solution of cupric sulphate.

7. Give the formula for phosphoric acid, phosphate of silver, and phosphate of calcium.

8. What is the ordinary process for preparing chlorine?

9. Give an account of the processes by which the oxygen, the carbonic anhydride, and the ammonia of atmospherical air may be estimated.

10. Here are ten common minerals. Give the name, composition, and crystalline system of each.

ENTRANCE EXAMINATION.

MR. W. ROBERTS.

1. Let there be a triangle ABC , and on the side AB let there be taken a point P , such AB is to PB as the diameter of a circle is to the line joining the extremities of two diameters at right angles to each other. Through P draw a line parallel to AC , and meeting BC in Q . It is required to find what part of the whole triangle ABC is the triangle PBQ .

2. Let ABC , $A'B'C'$ be two triangles: $AB = 11$, $BC = 17$, $A'B' = 31$, $B'C' = 57$, and the angle $ABC = A'B'C'$; find the ratio of the areas of the triangles.

3. Find how far a point must be from the centre of a circle (radius 10) so that the rectangle under the segments of a chord passing through it may be to the square of the radius in the ratio 576 : 625.

4. The sum of the perimeters of two circles is to their difference in the ratio 25 : 16, and the difference of their areas is equal to the area of a circle whose radius is 40; find the radii of the circles.

5. In a triangle ABC , $AB = 100$, $BC = 17$, and the angle ABC is half the angle of an equilateral triangle; find the area.

6. The sides of a triangle are 112, 441, 455; find the perpendicular dropped on the side 455 from the angle opposite to it.

7. The diameter of a circle is $10\sqrt{3}$; find the side of the equilateral triangle inscribed in it.

8. Find x from the equation

$$x(x+1)(x+2) = (x+5)(x^2-4).$$

9. Find the fourth power of

$$\frac{\sqrt{-3}-1}{2}.$$

10. What is the value of

$$\{p^2 + (p+q)^{pq-1}\}^{\frac{q-p}{p+q}},$$

when $p = 3$, $q = 1$?

LLOYD EXHIBITION EXAMINATION.

MR. M. ROBERTS.

1. Transform the differential $\frac{dy}{\sqrt{1-y^2}}$ by assuming

$$y = x(5 - 20x^2 + 16x^4).$$

2. Show that the differential $\frac{dx}{\sqrt{x^4 - 3x^2 + 3}}$ is put under the form

$$\frac{ldy}{\sqrt{(1+y^2 \tan^2 \lambda)(1+y^2 \cot^2 \lambda)}}$$

by assuming

$$x = \sqrt[4]{3} \frac{1-y}{1+y}$$

and find the value of $\cos 4\lambda$.

3. If $3 \tan \phi = 5 \tan \frac{1}{2}(\psi - \phi)$, find the value of $\int \sin \psi d\phi$.

4. If $(1+x)(1+x^2)(1+x^4)(1+x^8) \dots =$
 $1 + Ax + Bx^2 + Cx^3 + \dots$

find the values of A, B, C, D , &c.

5. Eliminate x between the equations

$$x^3 - px^2 + qx - r = 0, x^3 - xz + 2r = 0,$$

and arrange the result according to the powers of z .

6. If $2 = ax + bx^2 + cx^3 + dx^4 + \dots$ gives by reversion

$$x = Az + Bz^2 + Cz^3 +$$

find the condition that x^4 should be absent from the latter development.

7. If $\alpha, \beta, \gamma, \delta, \epsilon$ are the roots of

$$x^5 - px^4 + qx^3 - rx^2 + sx - t = 0$$

calculate the value of the determinant

$$\begin{vmatrix} \alpha & -1 & -1 & -1 & -1 \\ -1 & \beta & -1 & -1 & -1 \\ -1 & -1 & \gamma & -1 & -1 \\ -1 & -1 & -1 & \delta & -1 \\ -1 & -1 & -1 & -1 & \epsilon \end{vmatrix}$$

MECHANICS.

M. B. TOWNSEND.

1. Given arbitrarily two systems of forces in space; determine, geometrically, the two points for which their principal moments have parallel and opposite directions, respectively.

2. Three material particles, connected with a common point by three inextensible cords, repel each other with forces varying directly as their masses and mutual distances conjointly; given all particulars, determine their configuration of relative equilibrium.

3. The upper extremities of three equal uniform bars start without friction from a common universal joint, while their lower extremities, connected in pairs by three equal inextensible cords, rest on a smooth horizontal plane; given all particulars, required the ratio of the tension on each cord to the weight of each bar.

4. A number of equal smooth spheres, whose terminals are both fixed, and whose intermediates each touch the two adjacent, being supposed to form an arch of unstable equilibrium under the action of gravity; required the ultimate form of the arch, when the number of the spheres is indefinitely increased, and their magnitude indefinitely diminished.

5. A uniform horizontal beam, supported at two points A and B , situated anywhere between its two extremities M and N , is bent by its own weight; show that the two points of inflexion X and Y , of its curve of strained equilibrium, are those inverse at once to the two circles of which A and B are the centres, and AM and BN the radii.

6. An arc of a central conic being supposed to be the curve of free equilibrium of a uniform flexible cord, under the action of a force emanating in the proper direction from the centre; show that the tension at any point of the cord is that to the director circle of the conic.

7. An elliptic cylinder of uniform density floats, in the position of equilibrium for which its axis is vertical, in a fluid of greater density; investigate the conditions for the stability of its equilibrium under the action of gravity.

8. One extremity of a heavy uniform beam rests on a rough horizontal plane, while the beam itself rests against an equally rough horizontal cylinder touching the plane along a line perpendicular to its length; the coefficient of friction being supposed gradually diminished, required the initial motion of the system under the action of gravity.

9. A material particle, attracted to any number of fixed centres by forces all varying directly as distance, is constrained to move without friction in a fixed rectilinear tube of indefinite length; given all initial particulars, determine completely its motion.

10. The motion of a material particle, constrained to move without friction in a circle, under the action of a central repulsive force emanating from a point on its circumference, being supposed to be tautochronous with respect to the diametrically opposite point; determine the law of force.

11. The two arcs of a circle, intercepted between the two tangents from any external point in its plane, being supposed to be paths of brachystochronous motion, for the velocities of description which vanish at their extremities, under the action of central forces emanating in the proper directions from the point; determine for each the law of force.

12. A rough horizontal cylinder, capable of free rotation round its axis of figure supposed to be fixed, is kept in accelerated motion by the difference of two unequal weights attached to the opposite extremities of a flexible cord of insensible mass coiled partially round it; given all initial particulars, determine completely its motion.

ASTRONOMY AND OPTICS.

DR. R. S. BALL.

1. Show how to determine the latitude by the simultaneous observations of the altitudes of two known stars.

2. Describe the method of finding longitudes by Moon-culminating stars, and the Moon.

3. Prove the relation between the mean anomaly M , and the eccentric anomaly E ,

$$M = E - e \sin E;$$

and show how to solve this equation for E by first determining an approximate value, and then correcting that value

4. Show that annual parallax will cause the apparent place of a star to describe a minute ellipse about its true position.

5. If λ be the latitude of a star, ϵ the obliquity of the ecliptic, and k'' the constant of aberration ; then aberration would, in the course of one year, cause the apparent declination of the star to vary through a range

$$2k'' \sqrt{\sin^2 \epsilon + \cos^2 \epsilon \cdot \sin^2 \lambda}.$$

6. Assuming that the coefficient of refraction varies according to an inverse power of the distance from the centre of the Earth, prove Simpson's formula for refraction

$$M \cdot \sin z = \sin (z - N \delta z),$$

where z is the zenith distance, δz the refraction, and M and N constants.

7. Rays emanating from a point on the circumference of a circle are reflected by the circle ; find the caustic.

8. Determine the condition that two prisms, each placed in the position of minimum deviation, shall form an achromatic combination.

9. Lord Rosse's speculum has an aperture of 6 feet, and a focal length of 57 feet ; what must be the depression of the centre of the mirror below the plane of the edge ?

VICE-CHANCELLOR'S LATIN MEDALS.

DR. INGRAM.

A.

I.—Translate the following passages :—

- (a). *Beginning*, Per hoc idem tempus rumoribus excitī . . .
Ending, super his quae eum recte constiterit accepisse.
Amm. Mar., lib. xxii. cap. 6.
- (b). *Beginning*, Hinc nos egressos Persae cum saepe adflicti . . .
Ending, medicinae ministeriis fouebatur.
Ibid., lib. xxv. cap. 3.
- (c). *Beginning*, Scorpionis autem, quem appellant nunc Onagrum, . . .
Ending, ossibus capita ipsa displodant.
Ibid., lib. xxiii. cap. 4.
- (d). animabat autem Iulianus exercitum cum non per caritates sed per inchoatas negotiorum magnitudines deieraret adsidue.
- (e). imperator, cui non cuppediae ciborum ex regio more set sub columellis tabernaculi parvis cenaturo, pultis portio parabatur exigua, etiam munifici fastidienda gregario, quicquid ad ministeria postulabatur, per contubernia paupertina sui securus egebat.
- (f). . . ut ne suspicione quidem tenus libidinis ullius uel citerioris uitae ministris incusaretur.

(g). liberalitatis eius testimonia plurima sunt et uerissima inter quae indicta sunt tributorum admodum levia, coronarium indultum, remissa debita multa diuturnitate congesta, aequata fisci iurgia cum priuatis, vectigalia civitatibus restituta absque his quos uelut jure vendidere prae-teritae potestates. . . .

(h). et tanquam in alto gentis silentio extra calcem, ut dicitur, procur-
rebat, et intempestiue, parum etiam tum firmatis omnibus, ex actu-
ario rationibus scrutandis incubuit, qui fraudum conscius et noxarum ad mili-
taria signa confugit, finxitque Iuliano superstite in res novas quandam
medium surrexisse. . . .

(i). xystarchae similis purpurato.

(j). ego non rationalem iussi sed tonsorem acciri.

(k). uictus eius mensura atque tenuitas. uelut ad pallium mox rever-
suri.

B.

II.—(a). Explain *draconarius*, *admissionum magister*, *proximus libel-
lorum*, *cursus clavularis* (or *clabularis*).

(b). Translate *cataphracti*, *exauctorare*, *gradilis*, *pollinctus*, *reposco*
(subst.), *spadix*.

(c). In what rare, or otherwise noteworthy, senses does Ammianus use
annona, *disponere*, *excessus*, *lorica*, *mina*?

(d). "Existimabatur Mars ipse . . . ad fuisse castra Lucanorum inva-
denti Luscino." What is the story here referred to?

(e). "Cum post inaequales cursus intermenstruum lunae ad idem re-
vocatur initium." How did Valesius correct this?

(f). "Enituerunt hi, qui fecere fortissime, obsidionalibus coronis
donati." What is Gibbon's remark on these words?

(g). "Lapso milite qui se insessurum eoque dextra manu erexit." . . .
So Eysenhardt's text. Correct it.

(h). "Spe vivendi absumpta, quod percunctando Phrygiam appellari
locum ubi ceciderat comperit." Of what passage in one of Shakspeare's
Histories does this remind you?

(i). "Feriatur die quem celebrantes mense Januario, Christiani Epi-
phania dictitant." Zonaras mentions the same transaction as having oc-
curred τῆς γενεθλίου τοῦ σωτῆρος ἡμέρας ἐφεστηκυίας. Is this a real
discrepancy?

(j). "Quo temporis spatio antequam hi mitterentur, si exabusus princeps
paulatim terris hostilibus cessisset, profecte venisset ad praesidia Cordu-
enae." Valesius appears to have rendered this wrongly?

C.

III.—(a). Give some account of the Panegyrici Veteres. Which of the
writers in the collection is an authority for the life of Julian?

(b). Which of Julian's laws does Ammianus single out for reprobation?

(c). Give an account of the writings of Julian.

(d). Quote the striking lines of Prudentius on Julian.

(e). "Honoratior aliquis miles." Who, according to Gibbon, was perhaps intended in these words, which occur in the account of the election of Jovian?

(f). Gibbon draws a hasty inference from the words "Hostiis pro Joviano extisque inspectis"?

MR. TYRRELL.

A.

1. *Beginning*, At nunc si ad aliquem bene nummatum
Ending, lege uias propagandae posteritatis ostendit.
Amm. Mar., xiv. 6.
2. *Beginning*, Tunc illud apud Aquitanos euenit, quod latior . . .
Ending, quae res patrimonium diues euertit.
Ibid., xvi. 8.
3. *Beginning*, Antoninus quidam ex mercatore opulento . . .
Ending, illius similis Babylonii proditoris.
Ibid., xviii. 5.
4. *Beginning*, Nec enim dispositionibus umquam alterius . . .
Ending, proscriptiones miserorumque suspendia peruenerunt.
Ibid., xix. 2.
5. *Beginning*, Inter has tamen sollicitudines uleut . . .
Ending, innoxius abire permissus est.
Ibid., xix. 12.

B.

Explain and comment on the following:—

Scironis praerupta letalia declinantes; insolentiae pondera grauius librans; Marinus ex campidoctore eo tempore uacans; Actuarius sarcinalium principis iumentorum; Rationarius apparitionis armorum magistri; ab omni toga apparitioneque rogabatur; Centurio nitentium rerum; necessariis negotio tentis; naues lusoriae; ex primicerio protectorum; Comitatus fabrica; sebalet facem; Decimani Fortenses; repedantes sub modulis; praetenturae militum.

C.

1. In what unusual senses does Ammianus use the words *leuis*, *angustus*, *procinctus*, *ambitus*, *manubiae*, *vertices*, *subsiders*, *membra*; and what is the meaning of *bucellatus*, *leugae*?

2. Corpora nudantes intacta.

There is no reason for changing this reading?

3. Mediam velut finali intersecat libramento.

What correction of *finali* is proposed?

Correct the following:—

Mercurius *solemniorum* appellatus comes.
 Gaudentius *magnis* in rebus.

D.

1. Give passages from Ammianus throwing light on (a) his philosophy, (b) his religion.
2. Quote some of the most remarkable of the proverbs, similes, metaphors, and hyperboles of Ammianus.
3. Adduce phrases in which he seems to have had in his mind some celebrated passage of classical antiquity, especially adverting to his echoes of Juvenal, Tacitus, and Horace.
4. What other authorities have we for the period of history embraced by the extant books of Ammianus?

PROFESSOR BRADY, A. M.

A.

Translate, adding brief critical and explanatory notes where necessary :—

1. *Beginning*, Inducti itaque Patricius et Hilarius,....
Ending, unguibus male mulcati separantur exanimés.
Amm. Mar., xxix. i. 28-33.
2. *Beginning*, Haec per Gallias et latus agebantur Arctoum....
Ending, ad coeptorum cursum regrediar institutum.
Ibid., xxx. iv. 1-4.
3. *Beginning*, Quartum atque postremum est genus impudens,....
Ending, alia secum aduocatorum simulacra inducunt.
Ibid., xxx. iv. 14-19.
4. *Beginning*, Horum domus otiosi quidam garruli frequentant,....
Ending, ut deesse solus magister ludi litterarii uideretur.
Ibid.
5. (a). Quasi tota consilia quam sibi placentia secuturus.
 (b). Rediuiuas nebulas debitorum excitabat.
 (c). Quin potius sequimini culminis summi prosapiam, arma iustissima commouentem.
 (d). Vilis quidam plebeius infixerat illum dixisse, libenter se uino proprio calcarias extincturum quam id uenditurum pretiis quibus sperabatur.
 (e). Circumspecte uestiti.
 (f). Quum trium oppidorum ordines mactari iussisset.
 (g). Maeniana sustulit omnia (Praetextatus Praef. Urbis).
 (h). Solutis pressorii uestes luce nitentes arbitra diligenter explorat.
 (i). Rudentem explicuit immensum.
 (j). Id sermone addiderat Graeco σὺ δὲ νόμι καὶ στέφε τὴν τύλην.
 (k). Cum eum (Valentinianum) oblatus non susciperet equus anteriores pedes praeter stratorem erigens.

- (l). Sui periculi iudices.
 (m). In adaerandis reliquorum debitis non molestus.
 (n). Sepultura quae supremis honor est.
 (o). Super plantam, ut dicitur, euagatus Tartareus cognitor.
 (p). Verum quoniam denis modis singulis solidis indigentibus (Carthaginensibus) uenundatis, emerat ipse tricenos, interpretii compendium ad Principis aerarium misit.

B.

1. In what peculiar meanings does Ammianus use the following words: genuinus, exsertus, origines, pondera, suspectus, formae, instrumentum, impensae, baiulus?

2. The work of Ammianus occupies a remarkable position in Roman historical literature?

3. Describe the influences which probably moulded the literary style of Ammianus. What means did he take to give publicity to his work?

4. Comment on the employment of metaphorical language by Ammianus.

5. What extent of time does the extant portion of the work of Ammianus embrace?

6. How does the following bear upon the question of the date of Ammianus?—"Neotherium postea consulem tunc notarium ad eandem (African) tuendam ire disposuit (Valentinianus)." *Ammian. xxvi. 5, 14.*

7. Describe the principal MSS. of Ammianus. Give a short notice of Valesius, the writer of the commentary on Ammianus.

8. Mention the most remarkable episodes introduced by Ammianus.

9. "Errabant geminae Dirceae ad flumina tigres,
 Mite iugum, belli quondam uastator Eoi
 Currus; Erythraeis quas nuper uictor ab oris
 Liber in Aonios meritas dimiserat agros."

Statius, Theb., vii. 564.

The reign of Valentinian supplies a parallel to the above?

10. What allusion have we in Ammianus to a Licensing Act in Rome?

11. "Officiis regerem cum regia tecta Magister
 Armigerasque pii Principis excubias."

Rutilius.

Describe the functions of the official here alluded to.

12. Give some account of the Scholae. Who were the Protectores? By what Emperor were the Praetorian guards finally abolished?

13. Under what circumstances was the province of Valentia established in Britain?

14. Sketch from Ammianus the character of Valentinian, and notice his Educational and Sanitary Legislation.

15. "Nec ulla annalibus praeter Cannensem pugnam ita ad internecionem res legitur gesta."

To what event does Ammianus here refer?

16. Collect the personal notices in the work of Ammianus. What rank did he attain in the army?

L A T I N P R O S E .

MR. TYRRELL.

A born ruler, he governed the minds of men as the wind drives the clouds, and compelled the most heterogeneous natures to place themselves at his service—the smooth citizen and the rough subaltern, the noble matrons of Rome and the fair princesses of Egypt and Mauretania, the brilliant cavalry officer and the calculating banker. His talent for organisation was marvellous; no statesman has ever compelled alliances, no general has ever collected an army out of unyielding and refractory elements with such decision, and kept them together with such firmness, as Cæsar displayed in constraining and upholding his coalitions and his legions; never did regent judge his instruments and assign each to the place appropriate for him with so acute an eye. He was monarch; but he never played the king. Even when absolute lord of Rome, he retained the deportment of the party-leader; perfectly pliant and smooth, easy and charming in conversation, complaisant towards every one, it seemed as if he wished to be nothing but the first among his peers. Cæsar entirely avoided the blunder of so many men otherwise on an equality with him, who have carried into politics the tone of military command; however much occasion his disagreeable relations with the senate gave for it, he never resorted to outrages such as that of the eighteenth Brumaire. Cæsar was monarch; but he was never seized with the giddiness of the tyrant. He is perhaps the only one among the mighty men of the earth, who in great matters and little never acted according to inclination or caprice, but always without exception according to his duty as ruler, and who, when he looked back on his life, found doubtless erroneous calculations to deplore, but no false step of passion to regret. There is nothing in the history of Cæsar's life, which even on a small scale can be compared with those poetico-sensual ebullitions—such as the murder of Kleitos or the burning of Persepolis—which the history of his great predecessor in the East records. He is, in fine, perhaps the only one of those mighty men who has preserved to the end of his career the statesman's tact of discriminating between the possible and the impossible, and has not broken down in the task which for nobly-gifted natures is the most difficult of all—the task of recognising, when on the pinnacle of success, its natural limits. What was possible he performed, and never left the possible good undone for the sake of the impossible better, never disdained at least to mitigate by palliatives evils that were incurable. But where he recognised that fate had spoken, he always obeyed. Alexander on the Hyphasis, Napoleon at Moscow turned back because they were compelled to do so, and were indignant at destiny for bestowing even on its favourites merely limited successes; Cæsar turned back voluntarily on the Thames and on the Rhine; and at the Danube and the Euphrates thought not of unbounded plans of world-conquest, but merely of carrying into effect a well-considered regulation of the frontiers.

PREVIOUS MEDICAL EXAMINATION.

CHEMISTRY.

DR. APJOHN.

1. Hydrogen may be developed by the action of dilute sulphuric acid on zinc, and also by the action of *kho* on the same metal. Give the reaction in each of these cases.

2. Explain the mode of making liquor potassæ, and the action which it exerts on ferric sulphate. State also how from the precipitate produced in the latter experiment ferrum redactum may be obtained.

3. How is nitrate of silver made, and how is oxide of silver obtained from it?

4. Give the processes of the British Pharmacopœia for preparing the mercurous and mercuric chlorides, and explain how by the use of potassæ liquor they may be distinguished from each other.

5. How is bromide of potassium made, and how may iodide of potassium be detected in it?

6. Write the formula of acidum sulphurosum; explain how it is made, and the reaction in virtue of which it destroys the colour of a solution of iodine.

7. Describe and explain the methods of Marsh and of Reinsch for detecting arsenious acid in a solution.

8. Give the formula of glycerine, and explain how it is produced in the saponification of fatty matters.

9. Normal urine is acid, but when kept for some time after being rendered it becomes strongly alkaline. Assign the cause of this change.

10. How, by the method of Andral and Gavarret, would you make the analysis of blood so far as to determine the separate amounts of its albumen, its fibrin, and its hæmoglobine? State also which of these three principles is the most, and which the least abundant.

PHYSICS.

MR. GALBRAITH.

1. In ordering a bath at blood-heat, 98° F., what number of degrees would you prescribe Reaumur, and what number Centigrade?

2. Define a unit of heat, and find how many gallons of boiling water at 212° F. should be mixed with 20 gallons of water at 50° F. in order to get a bath at blood-heat.

3. Define the latent heat of steam. What is its amount according to the Fahrenheit and Centigrade scales? If the bath described in the last questions be heated by a steam-pipe, find how much steam must be condensed in the cold water in order to raise it to the required temperature?

4. Explain the principle of a freezing mixture. What is the use of sponging the surface of the body in fever, and on what principle is it done? What is the principle of the Spanish alcarraza, a porous unglazed earthen vessel for keeping water?

5. What effects have heat and pressure on air and the fixed gases? State the laws in exact terms.

6. What is meant by positive and negative electricity, as developed by friction? What is meant by the positive and negative poles of a battery?

7. Describe the arrangement of a Grove's battery and the principle of its action, particularly the part played by the nitric acid.

8. The extremities of two copper wires are brought up through two holes in the table before you and placed in your hands. State any method by which you would examine whether or not a current passes from one to the other when brought into contact; and if a current does pass, in what direction?

9. State in general terms the explanation of the accumulation of opposite electricities on the armatures of a Leyden jar.

10. State the laws which regulate the actions of moveable electric currents on each other, and by them explain the principle of the magnetization of a bar by a current.

DR. AQUILLA SMITH.

1. How is *Tinctura Cannabis Indicæ* prepared? State its therapeutic use, and write a prescription for a full dose in the form of a draught.

2. Remedies are employed, epidermically, endermically, and hypodermically. Give an example of each method.

3. State the exact proportion of opium in *Pulvis Opii Compositus*, *Pulv. Ipecacuanhæ Comp.*, *Pulv. Kino Comp.*, and *Pulv. Cretæ Aromaticus cum Opio*.

4. What is the composition of *Hydrargyrum Ammoniatum*, and how may it be readily distinguished from calomel?

5. State the parts of the plant from which *Extract*, *Tincture*, and *Wine of Colchicum* are prepared, and the average dose of each preparation.

6. What is *Kamala*? State its characters, action, dose, and mode of administration.

7. How is *Pilula Saponis Composita* prepared? State its use, and how much would constitute a full dose.

8. What is the composition of *Pulvis Antimonialis*, and how much of it would be likely to cause vomiting?

9. Describe the effects of the external application of *Croton oil*, and of *Unguentum Antimonii Tartarati*.

10. Write a prescription in Latin (without using symbols or abbreviations) for an eight ounce mixture containing *Oil of Turpentine* as its chief ingredient, and suitable for a case of chronic bronchitis.

DESCRIPTIVE ANATOMY.

DR. M'DOWEL.

1. Mention the connexions of the sacrum, and describe the mechanism by which it is retained in its position.
 2. The several connexions of the muscular fibres of the diaphragm, and their modes of action.
 3. Describe the tubercula quadrigemina, and enumerate their connexions.
 4. Enumerate in their order the muscles which are attached to the thyroid cartilage.
 5. Enumerate the muscles which are supplied by the ulnar nerve.
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BOTANY.

DR. MOORE.

1. State the elementary tissues of plants.
 2. Describe the normal form of a simple vegetable cell and its structure in accordance with the theory of Mohl.
 3. Describe an ordinary prosenchymatous vascular cell.
 4. Describe some of the chief distinctions of exogenous, endogenous, and acrogenous plants; and give examples of each.
 5. State the parts of plants which are generally described as their compound organs.
 6. Describe the anatomy of the leaf of an exogenous plant, and state the chief differences between the leaves of exogens and endogens.
 7. Describe the parts of a flower of an exogenous plant, when all the parts are present in the flower.
 8. Describe the parts of a normal ovule.
 9. Describe the parts of a plain or normal pericarp—say that of the bean or peach, or both.
 10. State the principal distinctions between the natural orders Ranunculaceæ and Papaveraceæ.
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EXAMINATION FOR DEGREE OF BACHELOR IN MEDICINE.

PHYSIOLOGICAL ANATOMY.

DR. M'DOWEL.

1. Describe the structure of the pericardium, and mention its several relations.
 2. Describe the structures which are associated with the mucous membrane of the duodenum.
 3. Describe the structure of the walls of the capillaries, and examine the question of their permeability to the blood which traverses these vessels.
 4. Give a general description of the arrangement of the muscular fibres of the stomach.
 5. Describe the principal lobes and fissures of the exterior of the cerebrum.
-

MIDWIFERY.

PROFESSOR SINCLAIR.

1. Contrast a pelvis deformed in consequence of rachitis, with one deformed from malacosteon; also describe minutely the obliquely-deformed pelvis of Naegle; and give the diagnoses of the three deformities during life.
 2. Describe the various forms of rigidity of the uterine lip during the first stage of labour; and give the treatment of such.
 3. What is meant by "*repercussion*"? When, how, and with what view is it practised?
 4. The diagnosis of shoulder presentation prior to the setting in of labour, and the treatment of such a case after labour has been established?
 5. Contrast a case of anæmia with one of chlorosis; and give the general principles of the treatment of each.
-

INSTITUTES OF MEDICINE.

DR. PURSER.

1. What is an inhibitory nerve? Give examples of this class of nerves.
2. What effect is produced on the blood by the action of carbonic oxide? How does this differ from that produced by carbonic acid?

3. How do the red blood corpuscles of the early human foetus differ from those of the mature animal?

4. Describe the structure and arrangement of the cells in tendon. How do you account for the appearance of stellate cells seen on cross section?

5. How does the structure of a sarcoma differ from that of a carcinoma?

MEDICAL JURISPRUDENCE.

DR. TRAVERS.

1. State the circumstances in which *external violence* may prove fatal within a brief period after its infliction, without either wound or contusion being perceptible in examining the body superficially, whether before, or after death.

2. A liquid holds in solution, and has suspended in it various alimentary and other organic matters, and also some soluble compounds of *arsenic and of antimony*. By what chemical means will you most readily separate the metallic bases, and estimate the quantity in which each of them is present?

3. By what conditions may the *gravid state be simulated*, anterior to the period at which the auscultatory signs would be recognisable?

4. The body of the newborn child, which had attained the complete term of uterine life, and had neither been eviscerated, nor otherwise mutilated, has been interred soon after death. Give your opinion, with the reasons on which you found it, as to the limit of time within which the *exhumation* of the remains might render it possible to discover

(a). Whether the *birth had been survived*?
and

(b). What had been the *cause of death*, if respiration had been established?

5. You are called on to attest the execution of a *Will*, or other testamentary document, by a person moribund or very ill. State what readily ascertainable result of enquiry would lead you to doubt or to deny the proposed testator's capacity, and consequently to refuse being a witness.

SURGERY.

DR. E. H. BENNETT.

1. Name the varieties of *nævus*, and state the conditions of each which render operative interference necessary or inadmissible.

2. Describe the modes of torsion used in arresting arterial hæmorrhage.

3. State the causes of *otorrhœa*; and describe the signs that indicate danger to the life of the patient suffering from this disease, and the ways by which death may follow in consequence of it.

4. What are the kinds of fracture of the os calcis? State their causes, signs, and treatment.
5. Give the characters of an acute external pile, and its treatment.

EXAMINATION FOR DEGREE OF MASTER IN SURGERY.

DR. ADAMS.

1. State the symptoms of gangrenous erysipelas affecting the organs of generation in the male subject; the prognosis you would form from the general appearance these symptoms usually present in their commencement, and the ultimate results you should anticipate.
2. In a case of subacute arthritis of the hip-joint in the example of a patient aged about twelve years, state under what treatment you should at once place your patient.
3. In a case of a dangerous wound of the common carotid artery made close to the origin of the artery, the hæmorrhage has been immediately suppressed, the wound has cicatrized, but the aneurism is increasing in size and vigour of its pulsations. How is the surgeon to act under these threatening circumstances?
4. In case of fracture of the fibula immediately above the ankle-joint, with displacement forwards of the bones of the foot, state (a) what preparations you would make to adjust the bones to their proper position; and (b) give the apparatus, compresses, bandages, and splints recommended by Baron Dupuytren to permanently adjust the displaced parts.
5. State the name of the practical surgeon who first described the complaint called "fissure of the rectum," and who recommended a very successful mode of treating this painful affection.

DR. BUTCHER.

1. In cases of ununited fracture, mention the various methods that have been suggested and put in practice to bring about *union*, and particularly the mode of management by the adoption of ivory pegs.
2. Describe a case of acute bursitis over the patella; the affections with which it may be confounded; and the most suitable treatment if operative interference be had recourse to. Describe minutely any complications that may arise.
3. Describe the various forms of hæmorrhoids presenting in the *rectum* and *its vicinity*. Characterise them. Give the vascular tumor so accurately described by Houston. Mention minutely their pathological differences, and detail the operative measures applicable to each.
4. Mention the locality of the most dangerous forms of syphilitic ulcers in the throat; the characteristic features of each; the urgent

symptoms characterising each, and the most suitable treatment for each.

5. Detail minutely the manipulation necessary to detect fracture of the radius near or somewhat distant from the wrist-joint. Describe Colles's views of the fracture and its treatment. Give Dupuytren's opinions also on both points, and the treatment advocated by each; and also Nelaton's practice in such cases.

DR. BENNETT.

1. Give the characters of an impacted extra-capsular fracture of the cervix femoris, in which the impaction persists.

2. Describe the operation of tapping a hydrocele of the tunica vaginalis testis; and state the precautions necessary in injecting the cavity with a view to the radical cure.

3. State the train of symptoms that would indicate intra-cranial hæmorrhage, resulting from injury of the head.

4. Describe the apparatus of Dupuytren for the treatment of fracture of the fibula, with displacement of the foot outwards. State the essential details of each step in its application.

5. What are the characters of iliac abscess, its causes and treatment?

SURGICAL ANATOMY.

DR. M'DOWEL.

1. Give the relations of the urinary bladder in the several situations which may be selected for the operation of paracentesis.

2. The course, relations, and distribution of the inferior thyroid arteries?

3. Trace the course of the obturator nerve, and mention its distribution.

4. Describe the course of the middle meningeal artery; distinguishing its relations into those without and those within the cranium.

5. Describe the operation for the relief of a strangulated femoral hernia. Mention the several structures which are implicated in the operation.

MR. WILSON.

1. Describe ophthalmia neonatorum, and state its causes and pathology. What are its complications and sequences, and what should the treatment be?

2. Contrast pannus with interstitial keratitis.

3. Describe the operation of enucleation, mentioning the instruments required. State briefly the conditions which render the operation necessary or advisable.

4. Give the ophthalmoscopic diagnosis of hypermetropia, and of myopia.

5. Describe onyx; what are its causes and complications, and how should it be treated?

EXAMINATION IN STATE MEDICINE.

DR. STOKES.

1. Does continued fever in this country occur as an endemic as well as an epidemic disease? In which form is it most frequently met with? Is it or is it not independent of contagion?

2. Give the derivation of the term "zymotic" as applied to essential disease.

3. State the relation of zymotic disease, so called, to fevers. May it exist independently of fever and of periodicity?

4. What maladies may be placed in the category of preventible diseases? Are the eruptive as well as the continued fevers to be so classed; if so, in what cases?

5. Are acute preventible diseases always contagious in acute essential affections?

6. In what class would you place cholera? Preventible or unpreventible? How does it resemble fever?

7. What is the supposed cause of trismus nascentium? Is it local or general? Preventible or non-preventible? Why has it been called the "nine-day fits"?

8. What is meant by the terms: contagious, infectious, zymotic, malignant, essential, febrile, continued, remitting, epidemic, endemic, periodic, and preventible, as applied to disease?

9. With reference to affections of the brain in typhus fever, what is the class of society most liable to such accidents? How far do they imply cerebritis or consequent mania?

10. In severe epidemics of the plague, it has been sometimes the practice to surround the infected city with a cordon of troops, and prevent the inhabitants from quitting it. How far is such a measure judicious?

11. What is the supposed difference in duration between the latent periods of variola, measles, scarlatina, the plague, and hydrophobia?

12. How far do contagions act more violently in districts where they have not appeared for a considerable time? Does the previous state of good health and of bodily vigour affect the result?

VITAL STATISTICS.

MR. GALBRAITH.

1. State the law according to which unchecked population increases, and illustrate it by a diagram.

2. What is the main obstacle to indefinite increase? With this view, how did Malthus propose to modify the law?

3. Quetelet, led by the analogy of physical laws, proposed two fundamental principles as to the law of increase of population and its limits, which, according to his statement, have been amply verified by experience?

4. Assuming the law of geometric increase, and the fact that the population of England increased in round numbers from 9 to 18 millions in the interval 1801-1851, find the annual ratio of increase.

5. Since the year 1851 to the present time, the annual increase has been very nearly maintained at the same rate; how can this be accounted for in the face of Malthus' doctrine of increase of means of subsistence? Taking everything into account, are you of opinion that the present population of England, about 24,000,000, can be long maintained at that figure? Judging from the density of population of other countries, what should be its probable future population?

6. Should the reported weekly death-rates of a large town population be taken as an exact criterion of their condition as to health? The year's rate for Dublin in 1871 was 25.5, can you state how this was distributed throughout the year in its first, second, third, and fourth quarter?

7. Draw up a tabular form for representing the weekly and quarterly mortality of a large population distributed according to disease; and also the attendant physical conditions calculated to affect, injuriously or otherwise, the sanitary state of the district.

8. If it be granted that 6 per cent. of vaccinated persons who are attacked by smallpox die, and 66 per cent. of those who have never been, find how many have been well vaccinated, and how many not, in 1800 cases, of which 480 die.

9. State as many facts as you remember illustrative of the comparative value of male and female life at different ages.

10. State the arguments for and against the dry-earth as opposed to the modern water-closet system, both as regards the public health and the economy of national resources.

METEOROLOGY.

MR. LESLIE.

1. What is the method by which a barometer or a thermometer is graduated?

2. Explain the theory of a vernier, used in reading philosophical instruments.

3. State the method of correcting a baremeter (*a*) for temperature, (*b*) for capacity. What is meant by the neutral point?
4. What are the principles of the maximum and minimum thermometers commonly used?
5. State Wells' theory of Dew, and any subsequent additions which have been made to it.
6. Give Howard's classification of clouds, and the symbols by which they are denoted.
7. Explain the effect of vegetation on the climate of a country.
8. What circumstances should be taken into consideration in selecting a locality of tolerably uniform temperature for invalids.

MORBID ANATOMY.

DR. E. H. BENNETT.

1. Define the varieties of congenital hernial tumour of the head, and state the positions in which they have been observed.
2. Compare the pathological appearances of the encephalon observed in fatal cerebro-spinal meningitis of epidemic origin, with the effects of encephalitis resulting from depressed fracture of the skull.
3. Contrast acute scrofulous caries of the dorsal vertebræ with the alterations produced by the erosion of a large thoracic aneurism involving several vertebræ.
4. Give the anatomical characters of the form of osteitis which results from exposure to the fumes of phosphorus.
5. Enumerate the species of parasitic cysts occurring in muscles, and give their distinctive characters.
6. State the evidence on which you would found a diagnosis between post-mortem blood clots of the heart and great vessels, and those which may have been causes of death.
7. Give the opinions of Baillie, De la Harpe, and Hodgkin as to the origin and nature of the white spots of the surface of the heart. Describe the anatomical characters of the varieties of these spots.
8. What are the histological features of sarcoma?
9. Describe the forms of cystic degeneration of the kidney.
10. Name the conditions under which fatal intestinal hæmorrhage has been observed in typhoid fever, and state the sources of the bleeding.

MEDICAL JURISPRUDENCE.

DR. TRAVERS.

1. What circumstances favour the action of *water on lead*? State how you would propose to counteract the contaminating influence, in cases where it might not be easily practicable to avoid altogether the use of leaden pipes or vessels.

2. When the death of the foetus at or just before birth, on the termination of the full period of uterogestation, is attributable to the effect of *secale cornutum* administered to the mother, whether should such result be referred to the toxic, or to the dynamic operation of that drug?

3. In what circumstances, and within what limits, may *cadaveric rigidity* be re-established?

4. Titius, a medical student in a University, volunteers to serve as a private soldier during a war of defence. In a skirmish, he suffers a sword wound, from which there is much *hæmorrhage*, arterial as well as venous; he is separate from his comrades, and has no surgical or other assistance; yet without bandage, or styptic, or extraneous appliance of any kind, the effusion of blood is effectively controlled. In what state of circumstances do you consider this possible to occur?

5. What morbid effects may have their origin in the introduction into the living system of metals, either in the state of vapour, or of very minute division?

6. By what means, practicable on a large scale, may a *hard water* be rendered fit for cooking, washing, and other domestic uses? Explain the rationale of the process you adopt.

7. A tidal river, which is polluted by the outflow from numerous common sewers, often emits a very offensive odour. What evidence, in addition to this, will be requisite to convince you, and enable you to convince others, that this manifest *nuisance* is also *dangerous*, or injurious to health?

8. Distinguish the action of *chloroform* in causing death—

(a). When taken in its liquid state into the stomach;
and

(b). When inhaled into the lungs in the form of vapour.

Give your reasons for the view you prefer; and, so far as your experience and recollection enable you, support your opinion by referring to actual cases and dissections.

9. In the treatment of *acute poisoning*, what are the cases in which (a) you would rely on the use of diffusible stimuli; and (b) what those for which opiates or other anodynes would be your chief remedies?

10. What are the characters by which you would distinguish *puerperal mania* from hysteria, and from other temporary deviations from sound mind?

HYGIENE.

DR. PURSER.

1. Can the poison of typhoid fever arise from mere *fecal decomposition*, or is the presence of a specific element derived from the body of a sick person essential? Discuss this question as fully as you can.

2. Besides typhoid fever, what other diseases are supposed to spread by infection contained in the *feces* of the sick?

3. How, according to Pettenkofer, is the spread of cholera and typhoid fever influenced by variations in the level of the sub-soil water? Besides these variations, what else does he suppose necessary to induce

an outbreak of the disease? What support has his theory received from other observers?

4. What are the diseases in the treatment of which a very large supply of fresh air is most essential?

5. In air vitiated by respiration, what is the injurious element? State the reasons for your answer.

6. What would you consider the minimum cubic space necessary per head for healthy persons? What for sick persons? How often, on these estimates, should the air be changed each hour?

7. Enumerate the principal diseases contracted by men from the lower animals.

8. What is the effect produced on the body by an excess of nitrogenous food?

9. What is the "*caisson disease*"? Give the chief symptoms.

10. What are the most common means by which lead finds an entrance into the body? Give the symptoms of chronic lead poisoning.

CHEMISTRY.

DR. APJOHN.

1. What is Dr. Parkes' definition of potable waters, and into what two groups may they be subdivided, depending upon the amount of earthy salts they hold in solution?

2. Describe the method of taking the degree of hardness of a water, and explain why this is generally diminished by boiling.

3. What is the special objection to a water containing much sulphate of lime?

4. Mention the means by which you would detect nitrites in a water, and, should these be absent, how you would test for nitrates.

5. What is Pettenkoffer's method of determining the amount of CO_2 in atmospheric air? State also, according to Dr. Parkes, what is the maximum amount of such gas which may be present without rendering the air unfit for respiration.

6. Assuming a close room of 1000 cubic feet capacity to be lighted by ten wax candles, and that in an hour each by burning loses 120 grains of its weight, what will be in cubic feet the amount of the CO_2 introduced into the atmosphere of the room?

N. B.—The composition of wax is

C,	. . . . .	80.2
H,	. . . . .	13.4
O,	. . . . .	6.4
		<hr/>
		100.0

7. The potential energy of meat food is greater than the energy it develops; but the potential and actual energy of sugar is the same. How is this known to be the case?

8. Enumerate the solids, the liquids, and the gaseous substances which are used to purify atmospheric air, and specify the manner in which each is supposed to act.

9. What are the gases which occur in sewers, and how would you estimate the amount of each?

10. What is meant by *dew-point*, and how may it be deduced from the indications of a pair of thermometers?

LAW.

REGIUS PROFESSOR OF LAWS.

1. Enumerate the different statutes now in force which constitute the Irish Sanitary Law.

2. State the various trades, businesses, or manufactures that are regarded as noxious in the Statutes; and state the duty of a medical officer in case such noxious trades should be a nuisance.

3. What are the principal powers which exist for the prevention of disease? In whom are those powers vested? And on what fund are the expenses to be charged?

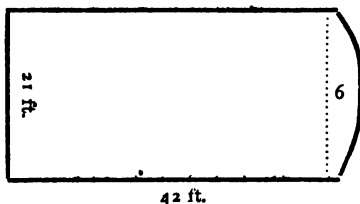
4. What does the word "Nuisance" under the Acts now in force in Ireland include?

5. If any sanitary authority should neglect the performance of its duty, how, and under what conditions, is such performance to be expressed?

6. How is a Sewer Authority to protect a Watercourse within its jurisdiction from pollution?

DR. DOWNING.

1. State the cubical contents of the barrack-room in the plan annexed, the height being 14 feet, and having one end a circular arc. The area



of the segmental end may be taken out by the approximate rule given by Parkes for buildings of the above form. What deduction from the total volume must be made for the body of each person and for the bedding? How many men, at the greatest, should occupy this room?

2. How would you secure the ventilation of the room in the last question? Indicate the best relative positions for inlets and outlets, their proper relative areas, and give in detail the different methods of construction. How many cubic feet of air per hour would you think necessary for the number you have given above?

3. Describe and name the instrument now laid before you, and the method of using it. (*Casella's Air-Meter.*)

4. State the chief recommendations of the three engineers—Messrs. Price, Cotton, and Palles—to whom the Corporation of Dublin referred all the plans for sewerage in this city, and point out how their plan differs from the main drainage authorized by Parliament but now in abeyance.

5. The Schemes for the Purification and Utilisation of Sewage may be classified as: I. Precipitation processes; II. Filtration; III. Irrigation. Under each head point out the more important of the methods in use, naming the Inventors or Patentees.

6. As to the extent of filtering area in proportion to the population, give the requisite amount as stated by the Rivers Pollution Commissioners, the soil being supposed naturally porous.

In the case of Irrigation, state the usual estimate of engineers for the acreage in proportion to the population.

7. Give in detail an estimate of the least quantity of water for each individual, and adding for municipal and trade purposes (separately), state what number of gallons per diem you would deem necessary for a large town, and compare the intermittent with the constant supply under high pressure.

8. State the annual rainfall in different parts of the United Kingdom, and the causes to which the great observed differences have been attributed. What amount or proportion of this is available for supply of towns, &c., pointing out the manner in which the different contour and nature of the surfaces of the rain basins and their geological characters influence the result.

EXAMINATION FOR DEGREE OF BACHELOR IN MUSIC.

SIR R. STEWART.

1. In what manner do you explain the clefs? How many clefs are there, and how many staves?

2. What are the various sorts of notes, ancient and modern?

3. Why do some pieces of music commence on the latter part of the bar?

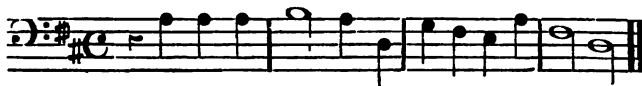
4. Arrange the following melody with four parts and in proper clefs : figuring the bass.



5. Arrange the same subject, placing the melody in the tenor.

6. Arrange the same, using the subject for a bass.

7. Why do the intervals of the subject and answer in Fugue sometimes differ?



8. Write a short fugue upon the above subject.

9. What is Temperament?

10. Do you know of any attempts to improve the tuning of keyed instruments?

11. What is the meaning of the expressions "a pair of organs," a "chest of viols?"

12. In what did the harpsichord and spinet differ from the pianoforte of our day?

13. To whose exertions may the popularity of J. S. Bach's music be attributed? Does Bach influence any other leading composers?

14. When did the following musicians flourish—Purcell, Händel, Mozart, Beethoven, Haydn, Cherubini?

15. When did Hector Berlioz live? For what was he celebrated?

16. For what do you consider the works of R. Wagner justly praised, and for what condemned? Name some of his compositions.

MR. MAHAFFY.

1. What was meant by the terms *Dorian*, *Lydian*, and *Phrygian*, in Greek music, and what were the varieties admitted under them?

2. What remnants have we of Greek tunes? Write out any one of them.

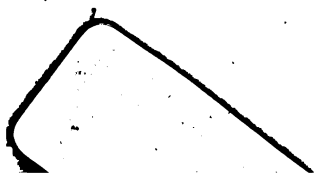
3. What evidence have we for determining the pitch of these tunes?

4. How can the *quality* or *timbre* of musical notes be explained physically? Can you describe any of the experiments lately made on this point?

5. What was the principle of the ancient water-organ?

6. Do you agree with, or differ from, the ancients as to the *moral* importance of particular kinds of music?

THE END.



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THE
Dublin University Calendar
FOR THE YEAR
1875.

Dublin: HODGKINS, FOSKOVILLE AND CO., 104, GRAFTON STREET.
London: HODGKINS, FOSKOVILLE AND CO.